

S1



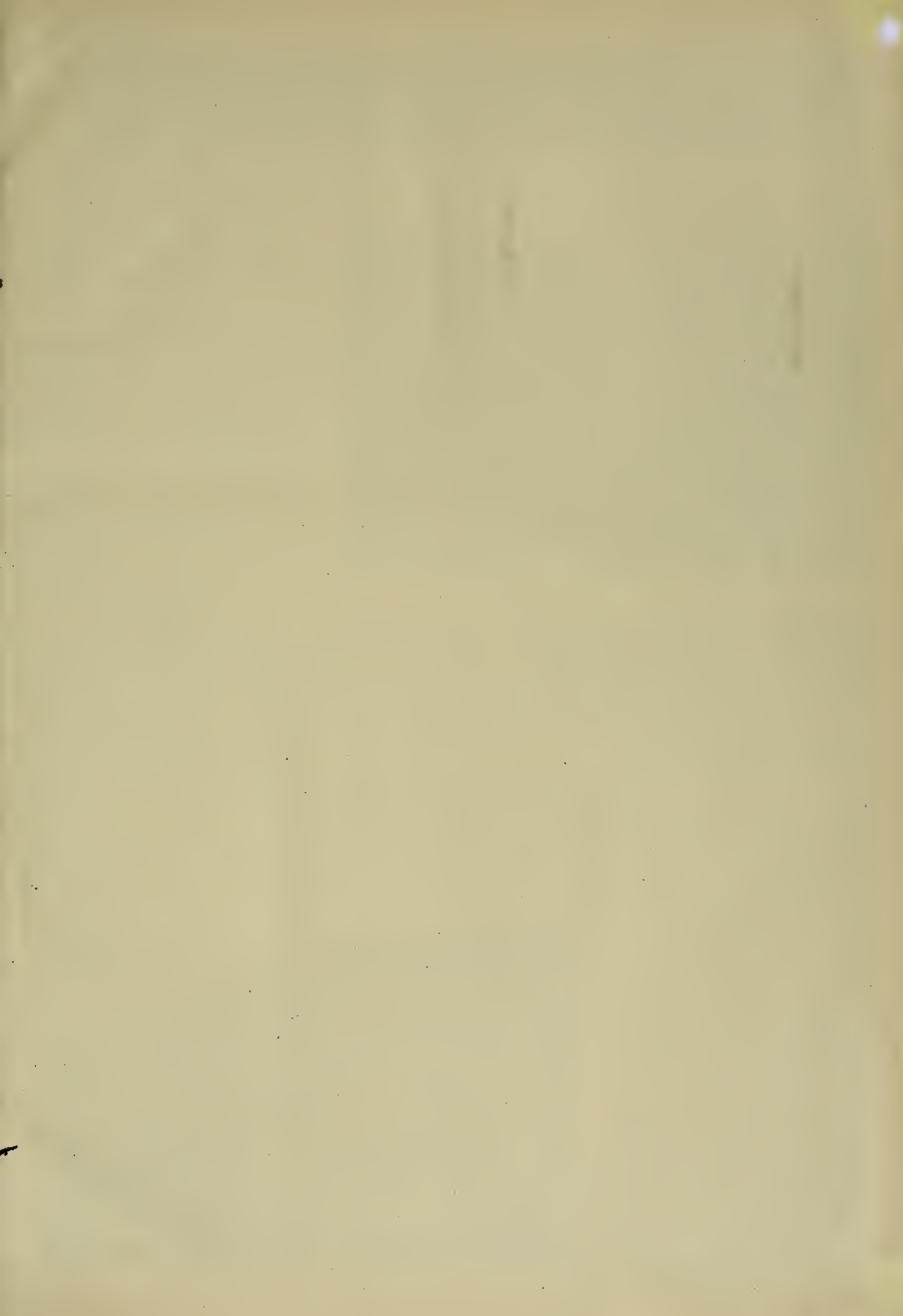
Y.

Accessions No. 123203

Received AUG 1903

Class 4c 622.05
1902

M 6
85



MINING AND SCIENTIFIC PRESS

Whole No. 2189.—VOLUME LXXXV.
Number 1.

SAN FRANCISCO, CAL., SATURDAY, JULY 5, 1892.

THREE DOLLARS PER ANNUM.
Single Copies, Ten Cents.

The Gold Mountain, Cal., Mine.

The Gold Mountain mine is situated in the Holcolm Valley district, San Bernardino mountains, San Bernardino county, Cal. It is reached by a stage journey of 40 miles from Victor, Cal. This mine was formerly owned by Lucky Baldwin, who operated a 40-stamp mill on it for a number of years. The mine was a losing proposition, owing to the low grade of the ore and lack of proper management. The mill burned down and the mine was sold to Capt. De Lamar, who erected a new 40-stamp mill and put Mr. Spargo in charge of the property, who has succeeded in placing it upon a paying basis.

The vein is a huge dike of quartz and quartzite, 60 feet wide, and can be traced for miles through the country. The ore averages from \$3 to \$6 per ton and is all free milling. All values down to 25 cents per ton are recovered by the plates and blanket sluices. The mine as operated is practically an immense quarry. Mr. Spargo has driven a series of tunnels under the vein at a depth of 100 feet from the surface. These connect with the open cuts by means of winzes. This enables the cars to be loaded through the chutes, without shoveling, and it is mined and delivered at the mill at a cost of about 40 cents per ton.

The company contemplate shortly erecting an 80-stamp mill below the present one.

Vagaries of Ore Bodies.

Some prospectors make the mistake of not confining themselves to their prospects. It is the prospect that makes the mine, and it should be followed until it has been proven beyond a peradventure that it is something more than a blowout or a body of local extent. Many prospectors find an outcrop of ore on the side or apex of a hill, scrape around it for a few feet, then go down the hill and begin an expensive tunnel; or they will discover the outcrop of what they assume to be a horizontal ore body, and, going back on the hill, will begin a shaft. They expect to catch the ore at so many feet, but they assume too much. It is not often that they prove absolutely correct.

If the ore is not continuous it almost invariably inclines one way or the other, and it proves more disastrous to attempt to catch it by interception than it would to follow it. If it is intended to catch it with a tunnel it is almost certain that a longer tunnel will be necessary than has been reckoned upon.



Gold Mountain Mine, San Bernardino Co., Cal., Showing Open Cut.

While the ore may appear at the surface as a vertical, radical changes may occur within a few feet or yards of the top, and it may dip off and become a flat shoot, or, if of local origin, pinch out altogether.

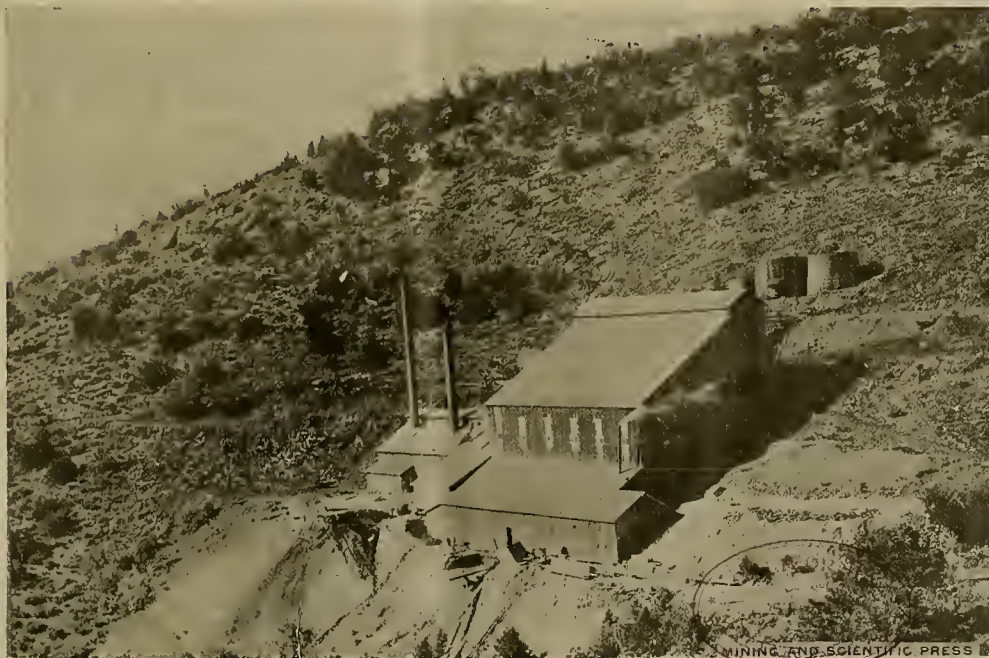
And the same with the outcrops of what go in and develop into verticals. By following them the miner is taking advantage of this, and he is likely to gain not a little information concerning the characteristics of the vein that may prove valuable in working, if it proves worth working.

In the folding of the earth's crust by which mountains and foothills were formed the fissures were opened that make veins, and from every main lode or mother vein laterals extend as the branches of a tree from the trunk. These laterals are smaller, do not extend so deep, frequently pinch out, sometimes do not bottom for 100 feet, always extend out either side of the main lode, with both walls alike, and can rarely be traced any distance. Whenever a vein extends in the same course 3000 to 5000 feet, and that course is the trend of the district, it should persist

in values to great depth or to primitive rocks where, of course, all mining ceases. It is not necessary that a vein shall be on a contact to be valuable, but as the ground parts easier in a contact than elsewhere, here the larger fissures have occurred and the greater values have been found to a greater depth. Intrusions have occurred in some veins and scattered the ore. This has been caused by a reopening of the fissure after the formation of the ore and an inflow of some of the lavas, most generally andesite, but these intrusions seldom extend to any great depth and the ore is found below in place and between the regular walls.

EXPERIMENTS on steam pipe condensation by putting results together and taking the average show that when the number of square feet of pipe surface exposed to still air is multiplied by the difference in temperature between the air to be heated and the steam inside of the pipe, and the product divided by the number of pounds of water obtained per hour by condensation, the quotient is practically 420, so that a rule for determining the amount of condensation in pipes, based on these results, is as follows: Multiply the number of square feet of pipe surface by the difference in temperature between the air in the room and the steam in the pipe. Divide the product by 420 and the quotient will be the pounds of steam condensed into water per hour. With 300 square feet of pipe, carrying ninety pounds pressure, in air at 50° F., the temperature of steam at ninety pounds is 331°, making the difference 331—50=281. Then $300 \times 281 \div 420 = 200$ pounds of water per hour. This rule is based on favorable conditions, which means that the air was nearly still. When the air is in motion the condensation will take place faster.

ADVANCE in steam boiler practice permits specifications to include, in addition to the usual tensile and hydrostatic tests, the following trial conditions: Evaporation 11.5 pounds, where 10.5 pounds is usually specified. Priming, foaming or lifting to be impossible, and moisture in steam not to exceed 1% under any conditions. To stand forcing to 50% above rating to date of acceptance, without leaks, or above 10% loss in economy; quick changes between no load and full load, or sudden drops in pressure from any cause; in no case the circulation to be reversed, the tubes overheated, or the water lifted. Ground hand hole joints to be made tight without bolts. Internal cleaning to be accomplished without shutting down, or the use of mechanical cleaners.



View of Mill, Gold Mountain Mine, San Bernardino Co., Cal.

MINING AND SCIENTIFIC PRESS.

ESTABLISHED 1860.

Published Every Saturday at 330 Market St., San Francisco, Cal.
TELEPHONE, DAVIS 771.

ANNUAL SUBSCRIPTION:

United States, Mexico and Canada.....\$3 00
All Other Countries in the Postal Union..... 5 00

Entered at the San Francisco Postoffice as second-class mail matter.

Chicago Office (Telephone, Harrison 73).....737 Monadnock Block.
Denver Office (Telephone, Olive 733).....606 Mack Block.

J. F. HALLORAN.....Publisher.

San Francisco, July 5, 1902.

TABLE OF CONTENTS.

ILLUSTRATIONS.—Gold Mountain Mine, San Bernardino Co., Cal., Showing Open Cut; View of Mill, Gold Mountain Mine, San Bernardino Co., Cal. 1. Diagram Showing Increase of Rainfall With Rise in Elevation Over the Sierras in Central California, 6. Mining and Metallurgical Patents, 10.

EDITORIAL.—The Gold Mountain, Cal. Mine; Vagaries of Ore Bodies; Formation of Mountains and Foothills; Experiments on Steam Pipe Condensation; Advance in Steam Boiler Practice, 1. Admitting Arizona to Statehood; "Mining" Advertisements in Eastern Dailies; Editorial Commendations; Expert Evidence; New Survey Rates, 2.

MINING SUMMARY.—11-12-13-14-15.

LATEST MARKET REPORTS.—16.

MISCELLANEOUS.—Concentrates, 3. Assaying Copper Ores and Products; Nevada's Surface Mineral Wealth, 4. Made Ground; Liability of Mine Employer; Science Not Essential to the Prospector; A New Explosive, 5. Relation of Rainfall to Runoff in California; Mexican Mining Notes, 6. Production of Copper; Liquid Fuel—Boiler Firing With Oil; Copper Converters, 7. To Dissolve the Smelter Trust; Hoisting Works for Deep Mines; Knowledge Needed in Mill Work; Chlorine and Gold, 8. California Mining Industry; He Had Not Resigned; American Copper Mine, 9. Mining and Metallurgical Patents; Deep Borings in the United States, 10. Personal; Commercial Paragraphs; New Patents; Notices of Recent Patents; Recently Declared Mining Dividends; Trade Treatises; Books Received, 16.

THERE is no good business reason for delay in admitting Arizona to statehood, but there are several business reasons why that rich Territory ought to be a State. It isn't a question of "justice," or politics, or sentiment, but a business proposition. The country is really dependent on the West for the hulkion that is the blood of business. Anything that aids in developing the country's highest and best paying industry is good business to do. A State is always better fixed for mining than a Territory. Arizona is a rich mining region, and thus business, national policy and general progress dictate advance. Statehood for Arizona is in direct line with such advance.

SOME of the "mining" advertisements in Eastern dailies are so ridiculous as to make one wonder if there be people silly enough to believe them. Yet the thousands of dollars so spent manifestly yield big returns from the credulous victims. These advertisements of hogus mining properties never appear in any place where any one is likely to have any knowledge of the facts. They are not intended for home consumption, but are published in the large Eastern cities. Their circulars are sent by the thousand to rural residents in prosperous localities. Iowa has given up several hundred thousand dollars to such sharks. Illinois and Indiana are also good fishing grounds. An amusing part of the business is big advertisements of mine swindles in New York and Boston weekly "mining" journals, while alongside appear denunciations of other similar schemes, in hopes, perhaps, of compelling them to pay tribute to the editorial prostitutes.

FROM Arizona and Montana come commendations of editorial utterances herein, which is usual and is appreciated, but noticed here because of the suggestion that such utterances be repeated, the importance of the subject discussed deserving reiteration, and, indeed, requiring repeated notice, that the matter be brought to the renewed attention of mining men everywhere. While agreeing with our correspondents in the belief that that subject does deserve continued editorial reference, yet, in this as in other equally important matters, it is manifestly impossible to give it more than passing attention. So many things press on for deserved notice that they can (any one of them) only get brief hearing. There are several subjects that deserve constant discussion, but in such a journal as this, continued harping on one string, or even several strings, would argue a poverty of resources and would inevitably elicit a suggestion from several thousand busy men that something new were more desirable. This indicates sufficient answer to the suggestion, which, in the main, is a good one.

Expert Evidence.

When two mining companies go to law, the experts retained by each side to give testimony form a prominent and important part in the case. Theoretically, the expert is honest and competent. Sometimes he is both; occasionally he is honest without being competent; it is within the limits of possibility that there may be times when he is neither. The best expert is entirely honest and thoroughly competent. As to his value—an expert is a witness. When cases can be carried on in court without witnesses, then mining suits, involving mining rights, can exist without experts. Of course, if there were not two views by different lawyers and two views by different experts on a given subject, there would be no litigation—there could be none. It is the function of the court to determine which of these two opinions is more nearly reasonable, which is right, as the court sees it. The decision lies with him, not with the experts, nor the attorneys. The first court may be wrong, but the case can go to the appellate court and two appellate courts may see it differently.

What the duties of an expert are is of itself a debatable question. It may be considered that an expert, honest and competent, will sift the facts, bring his knowledge to bear on the point at issue, present those facts as he sees them to the best advantage for his client and tell the truth—not the whole truth, but what he says is to be the truth. Two men can honestly have different views on the same subject, and can, with equal honesty and knowledge of the facts, draw diametrically opposite conclusions. It is then for the judge to decide. If he knows all about that maze of modern mystery called "mining law," it is well for all hands; if he is not fully posted as to that particular case, it would be well all round that the court be permitted to have its own expert as a technical adviser. The opinion of such an adviser upon claims, infringements, damages, etc., would be of manifest value. When experts are put on the stand by the parties to the suit, the judge is sometimes justified in regarding their testimony merely as arguments under oath, where prepossession or bias or undue zeal often generates erroneous conclusions. Indeed, much of the expert testimony which judges are called upon to read is largely disregarded. The most conscientious experts can, as lawyers generally do, convince themselves by their own arguments of the correctness of their position. And if anyone keeps on thinking and saying anything long enough he will get to believing it himself after awhile. The conclusions of an expert selected by the court, or concurrently by the parties, for his qualifications in the particular case, would command genuine confidence, would largely control the decision of doubtful questions, and would relieve the court of great responsibility. Such an innovation would also be economical, and tend to a quicker conduct of mining litigation.

Throughout, this is putting the expert on a very high plane, but he ought to be on a high plane. Ordinarily the public deride expert testimony. This is because of the popular misunderstanding of facts, due to a hazy notion that an expert is a good deal like a lawyer, and if the facts don't fit the desired verdict, why so much the worse for the facts. An expert should be on as high a plane as the court itself, only that the expert does not decide the case. Of course, right here the reader may say: "If the court had its own expert, as you suggest, it would place so much reliance upon the conclusions of its expert that the judgment ordered would in many cases be that of the expert and not of the court." True, and in that case it might be a just judgment and in entire accordance with the law and the facts, but the suggested contingency need not arise to any greater degree than it would in the present procedure, where the court in its decision is likely to give greater weight of credence to one expert than to the other. Any expert worthy of the name, on either side or any side, will, so to speak, take the law into his hands. He can't help it. He knows; he is better acquainted with the facts than the others, and oftentimes better posted on the law in the case. He is not exactly "the whole thing," but he is the highest part of it.

This paper thinks that in mining cases involving the need of expert testimony it were well for the

court to have its own technical adviser, call him "expert" or anything else. This need not debar the litigants from having their own experts, too, for the court might not always select one as competent to take up the technical and scientific features of the case as other available persons known to the lawyers of the litigants, and thus an injustice be done, although, undoubtedly, the expert adviser of the court would always be competent to review the testimony of the experts for the litigants. Such suggested employment of a court adviser would tend to shorten the time consumed in taking testimony, and help to lessen expenses. It would result that testimony by experts for litigants (knowing that an expert appointed by the court was to review their testimony), would be shorter, sharper and more direct, and, possibly, even the lawyers might then trim the case down in view of that very fact, and not lumber the record with matter "irrelevant, incompetent and immaterial."

It would also weed out the shifty, crafty, unreliable "expert," and inure to the benefit of the really reliable expert and all concerned in having justice done and having the right prevail.

It might be added that in whatever way an expert might be employed by the court, as is here suggested, it would not be possible for him to thoroughly understand the case, unless he had views of other experts on the subject. An expert usually does not, in one sense, make the case, but he stirs up the case, so that one is able to get at the truth, and the stirring up of the case is best done by having two competent men discuss the matter on opposite sides.

As to the common spectacle of two experts on different sides testifying different ways as to the same set of facts, it by no means follows that either one is insincere or dishonest. Two honest experts may in a mining case testify honestly directly opposite to each other. The reason is this: In every case the opinion of an expert is based upon his understanding of the facts. Now two persons having opposite characters of mind may form two different views, and honestly, too. It is the duty of the court in that case to determine which particular expert view is the proper one. And in such case an expert for the court would be a valuable adjunct.

Judges are usually chosen for their probity and for their legal qualifications, not for their scientific attainments.

It is not uncommon to have the courts and the public attack or criticise experts, and sometimes with reason. The remedy does not lie in an attack upon the judges or a sneer at the public, nor in a defense of the defects in the present procedure, but in an effort to reform and improve the system and the sometime conduct of the experts themselves.

New Survey Rates.

There is a notable change in the federal charges for mineral surveys. In accordance with paragraph 3, General Land Office circular of the United States mining laws, approved June 24, 1899, relating to the expense of office work connected with the survey of mineral claims, which authorizes the Surveyor-General in each district to require a deposit for platting and other office work for mineral surveys, the General Land Office has directed that on and after July 1, 1902, the estimated cost of platting and other office work in connection with the surveying of mineral claims will be computed as follows:

For lode claim.....	\$30
For placer claim.....	35
For millsite.....	30
For millsite, included in one survey with a lode claim.....	20
For each lode claim within and included in the survey of a placer claim.....	20
For several lode locations included in one survey, the first location named.....	30
All other locations included, each.....	25
For several placer locations included in one survey, the first location named.....	35
All other locations included, each.....	30
For affidavit of \$500 expenditure of improvements, after approval of survey.....	5
Should an amended order issue, an additional deposit will be required.	

Any traveling agent claiming to represent this paper is an impostor unless he can produce properly signed credentials and possesses a book of receipts numbered in triplicate.

Concentrates.

COPPER tubing one inch inside diameter, of standard thickness, will stand a heat of 700° F.

ONE HUNDRED cubic feet of water per hour is a miner's inch in Colorado; $1\frac{1}{2}$ cubic feet per minute is a miner's inch in California.

THERE is a difference in "barrels" as applied to oil measurement. A barrel of crude petroleum is 42 gallons—5.6146 cubic feet; a barrel of refined petroleum 50 gallons—6.684 cubic feet.

CRIPPLE CREEK, Colo., has been yielding net profits from the start, and in eleven years the gold mines there have earned public dividends and undivided profits to the amount of \$31,000,000.

AMMONIA SULPHATE OF COPPER is made by adding ammonia hydrate to a solution of sulphate of copper in water, till the precipitate which is formed at first is dissolved. A clear blue liquid results.

THE dip of a ledge can be followed from a mining claim into land covered by an agricultural patent, but the dip of a ledge can not be followed from land covered by an agricultural patent into a mining claim.

MAGNALIUM is an alloy of aluminum and magnesium, used in the construction of mine-surveying instruments. The alloy gives as good results as brass and weighs but one-third as much, size for size.

THE cost of handling ore by aerial wire rope lines, like all other things in mining work, depends entirely upon local conditions. Under favorable circumstances the cost would be estimated at 5 cents per ton mile.

THE power of any explosive can be figured from its formula. Find the number of volumes of gas which can be produced by the combustion of the substance. This at 15 pounds per volume will give the pressure.

COMPRESSED AIR can be used directly for ventilation, refrigeration, drying, or operation of elevators. It is not a rival of electricity, but has its field as one of the great motive powers, the same as the steam or gas engine.

SMALL "model" stamp mills can be made to give results that cannot be duplicated on a commercial scale. A mining school should have a standard equipment of mining appliances to afford instruction of any tangible value.

A "CARLOAD OF ORE" is an indefinite quantity. On a broad gauge road it is usually about sixteen tons; on a narrow gauge from eight to twelve tons. Much depends on the condition of the roadbed, the car itself, and how it is loaded.

MERE supposition or imagining is not enough to require a mining ditch owner to flume because of possible resultant damage to adjacent mining property. But he must guard against such damage, and is responsible for any loss occasioned thereby.

IF a volume of air at sixty pounds pressure, equivalent to 18,000 cubic feet per hour at atmospheric pressure, be passed through 1000 feet of pipes, the loss of pressure of air for $2\frac{1}{2}$ -inch, 3-inch and $3\frac{1}{2}$ -inch pipes would be 5 $\frac{1}{2}$ pounds, 2 pounds and $1\frac{1}{2}$ pounds, respectively.

THE "talc" of the mineralogist is a different thing from the "talc" so-called by some miners. Real talc is a little like mica and is semi-translucent. It is a silicate of magnesia. What is ordinarily called "talc" is a silicate of alumina, a clayey mineral much like kaolin.

THE sulphobalides of lead are readily prepared by dissolving lead sulphide in the balogen acid and diluting this solution with water. The chlor and bromsulphide separate immediately as red precipitates. An excess of water converts this precipitate into black lead sulphide.

LAKE SUPERIOR figures that copper ore yielding 1% will pay costs. One and one-half per cent ore will pay a profit. The most economical metallurgical and mining processes are in operation in the Lake region, though but little ahead of some Montana and Arizona copper properties.

WHERE peroxide of hydrogen, as an antidote for internal cyanide poisoning, is not immediately obtainable, two drops of ammonia on a lump of sugar and eaten immediately forms a fair antidote. In cases of external cyanide poisoning a warm bath containing bicarbonate of soda and common salt will allay the eruption.

THE California State Mining Bureau has \$57,000 public money for its biennial expenses. Of that sum \$10,000 goes for printing, \$29,000 for field work—outside investigation and reports—and the remainder for rent, salaries, supplies and general expenses. It is and always has been faithfully and economically administered and is of great public benefit.

AS to recording notice of location of mining claims in California it is not deemed sufficient by the Surveyor-General, when application for patent is made, that copies of location notices certified to by the district recorder be supplied. It has been held that these notices "must" be recorded with the county recorder and certified copies thereof be furnished by the county recorder.

THE statement that "when the water is evaporated into steam it leaves all of the impurities behind it," is not always true, for some of the impurities and solid matter will pass out in and with the steam. Cases may be cited where the safety valve of boilers being continually leaky, when examined, a thin coat of white scale

was found on both valve and seat, caused by using soda ash as a boiler compound.

THE lifting power of any gas is the difference between the weight of the gas and the weight of the same volume of air. One cubic foot air at normal pressure weighs 1.29 ounce avoirdupois; one cubic foot pure hydrogen under the same conditions weighs 0.089 ounce avoirdupois. The difference is 1.2 ounce, which is the weight that one cubic foot of hydrogen will balance in the air. It will lift any weight less than that.

TO UNITE ordinary cast iron is not an easy task, but it may be done, if one has luck, by boring a dozen holes in the parts to be united, then secure well and place about the break an abundance of filings of good pig iron, some wrought iron filings and also some of steel. Lute with fine clay and place in fire (before luting use any good flux, borax, etc.); heat until the filings melt and fill all the cavities. Let remain in the fire until fire goes out and the metal is cold; then remove and clean up.

IN applying the straight-line formula to composite columns made up of several sticks bolted together at intervals, give to each stick its proportionate share of the total load to be carried over that member, and then assume that it stands alone and unsupported. This is the only safe rule. Even though they are firmly bolted with packing blocks or washers notched into the sides, these grow loose in time, and do not resist initial lateral bending. They should never be assumed to act as one solid stick.

THE cost of a 100-ton cyanide plant in the Black Hills, S. D., would be from \$25,000 to \$30,000. To run it per day of twenty-four hours would average for labor, per day: Two engineers at \$3.50 each; two firemen at \$3 each; two crusher men at \$3 each; two men on rolls at \$3.50 each; two solution men at \$3 each; four pulp men at \$3 each; one chemist at \$5; one assayer at \$3.50; one helper at \$2.50; total, \$55. Cost per ton for treating would be: Labor, 55 cents; cyanide, 30 cents; coal, 30 cents; zinc, 10 cents; repairs, 10 cents; incidentals, 10 cents; total, \$1.45.

A COMPOUND ENGINE is one having two or more cylinders, usually two, however, a high pressure cylinder and a low pressure cylinder, the latter being the larger. The steam from the boiler enters the high pressure cylinder and after performing a certain amount of work it is exhausted into an intermediate vessel or cylinder called a receiver, whence it is admitted into the low pressure cylinder; after performing a certain amount of work in this cylinder it is allowed to escape into the condenser, in a compound condensing engine, and into the atmosphere in a non-condensing engine.

IT is held by some millmen that the crushing in a stamp mill is mainly the result of the reaction from the die after the stamp has fallen, citing the fact that if a stamp is allowed to fall upon a single chunk of ore resting upon the die the upper portion of the lump will be found merely fractured, while a good deal of that part of the chunk next to the die will have been reduced to powder. The logical conclusion of this is that the crushed material should be got out of the mortar as soon as possible. It is thought that with free milling ore 60% of the gold should be caught in the mortar.

ONE way to tell the weight of ore in a mine "in sight" is to exactly measure an excavation from whence a known weight of ore has been removed. Determining the weight of ore in place is a work requiring extreme care: 13 cubic feet to the ton applies only to solid quartz rock. In the case of oxidized ores it may require from 15 to even 18 cubic feet to the ton, while in lead, zinc and other base metal mines it may require less than 13 cubic feet to the ton. As a general rule, it may be stated that the cubic contents of an ore body in feet, if divided by 11 if sulphides and by 15 if oxidized, will give the tonnage, approximately.

IN the same gulch or river channels the smaller pieces of water-worn gold are purer than the larger ones. The exterior layer of water-worn nuggets is finer than the interior. Native gold always contains silver. On an average about one-tenth of a gold nugget is silver, which is more easily corroded than gold and readily attacked by sulphuretted hydrogen, common salt and other ingredients of surface waters. Such substances act upon the silver close to the surface of a nugget and dissolve it away, or convert it into the compounds which wear away as the nugget is rolled forward beneath the heavy gravels at the bottom of a stream.

ABSOLUTELY PURE SILVER is produced in the United States Mint by electrolysis of fine silver, using an electrolyte of silver nitrate with 1% free nitric acid. From the bar of silver 0.999 electrolytic action throws the silver down in the form of crystals, which are washed. In melting these crystals the flux used is three parts fused borax and one part pure niter. The bar's second melting is made without a flux to remove the oxygen introduced by the niter of the flux. When the silver is thus melted it is stirred with a piece of dry wood as long as the action due to the presence of oxygen continues, then poured into a chalk-lined mold, the bar cleaned with a brush and dilute sulphuric acid, and after being rolled out is ready for use.

THE Rankin leaching process of copper extraction is operated by R. A. Rankin at Tartana Hill, Queensland, Australia. The process is simple. The ground ore is placed in a vat with a dilute solution of sulphuric acid, and agitated for an hour, in which time all the copper contained in the ore is dissolved out and converted into a

solution of sulphate of copper by the acid liquor. The contents of the vat are then run into a settling vat, where the slime sinks to the bottom, leaving the clear sulphate of copper solution to be drawn off into precipitating vats. Water is added to the slimes, and after these have settled again the liquor is drawn off in its turn into the vats, the removal of all the sulphate solution being thus secured, deposition of the copper is obtained by placing zinc or iron in the vats. This throws down the pure metallic copper—in the former case in very thin leaves, and in the case of the iron as a fine powder. The precipitate is washed off the iron by hosing with water. The ore used in the experiments was graded up to 15%, the analytical test giving 27.42% of carbonate of copper or 14.13% of copper (metal).

THE capacity of any pump cylinder per minute is equal to its area multiplied by the length of the stroke of the piston or plunger and by the number of strokes per minute. The area of a 4-inch cylinder is $4 \times 4 \times .7854 = 12.56$ square inches; this multiplied by the length of the stroke gives 75.36 cubic inches, as the volume of water discharged for one stroke. The discharge for 120 strokes would be $75.36 \times 120 = 8643.2$ cubic inches = 37.4 gallons per minute. A pump will not discharge that much water, owing to the friction of the water in the pipes and to slippage, which amounts to an average of 25%; 75% of 37.4 gallons is 28 gallons. By the term slippage is meant the difference between the theoretical quantity of water discharged per stroke, per minute or per hour as the case may be, and the quantity actually discharged by a pump in which the pistons and valves are water tight. If the quantity obtained by calculation is 100 gallons per minute, and the pump actually discharged 85 gallons per minute the slippage is said to be 15%. The loss by slippage does not include the loss by leakage. The former refers to the difference between the calculated and actual discharge at the pump when the latter is in good working order, that is, when the piston or plunger and the valves do not leak.

THE weights of electric locomotives vary from 4000 to 30,000 or even 40,000 pounds. A 12,000-pound machine would have about the following proportions: draw-bar pull on the level, 1500 pounds; speed, 6 to 10 miles per hour; two 20 H. P. motors; a minimum gauge of from 27 to 30 inches; minimum width over all, 48 to 50 inches; minimum height of from 36 to 40 inches; length, excluding bumpers, from 9 to 12 feet; wheel base, from 40 to 55 inches; diameter of wheels from 28 to 30 inches. A 24,000-pound locomotive would have a draw-bar pull of 4500 pounds; 6 to 10 miles speed; two motors of 50 H. P. each; gauge of from 35 to 40 inches; outside width of from 58 to 65 inches; height of from 38 to 45 inches; total length of from 11 to 12 feet; wheel base length, from 40 to 56 inches; and diameter of wheel from 28 to 30 inches. The minimum weight of rails that can be used satisfactorily varies from eight pounds per yard for a two-ton locomotive to forty pounds for the heaviest. Mines using from 12,000 to 16,000-pound machines should, under ordinary conditions, use about a 30-pound rail. Where exceptionally heavy service is encountered the adoption of sixty-pound rails is meeting with favor. The draw-bar pulls are given for running on the level. On an up grade the pull will be reduced on account of the locomotive having to pull up its own weight. The element of the force of gravity tending to pull the car down hill, and which therefore must be overcome, is approximately one hundredth of the total weight for each per cent grade. This would be equivalent to a draw-bar pull of twenty pounds per ton. In the case of the 12,000-pound locomotive given above the draw-bar pull on a 5% grade would thus be reduced from 1500 to 900 pounds.

OCCASIONALLY comes the question: "What is your authority for the statement you make in the 'Concentrate' wherein you state, etc.?" The MINING AND SCIENTIFIC PRESS is pretty good authority itself, and what it asserts is usually authoritative. This is not said in an arrogant way, but with becoming humility, duly mindful of all it implies! The word "authority" is vague. Generally, it means a statement or decision coming from some source of recognized ability, knowledge and final jurisdiction. Sometimes it is an opinion; sometimes an interpretation; sometimes a decision; sometimes a succinct statement of a patent fact. To quote "authority" for a statement herein does not always add to the value of the matter, and often it would merely invite contradiction. Take, for instance, the question of water rights in California, or tunnel sites in Colorado, or location law in Arizona: No matter how wild or incorrect a statement may be made anywhere on those subjects, some decision of some court of competent jurisdiction could be cited as "authority" thereon. Even the Supreme Court of the United States—the biggest tribunal on earth and the best "authority"—sometimes reverses itself. It does not follow that there is no established "authority," but it does follow that in matters of opinion there can not be a continued holding to the same view. Even facts themselves change, and so does "authority" thereon. When a statement of fact is made herein in answer to one of the numberless questions answered on this page, it is the fact as at present existing; if it be on a matter of opinion, a decision of a court, or established belief, the statement is made in consonance, so far as possible, with existing facts, these facts being procurable from the most recent developments, and that constitutes "authority." Of course, "infallibility" is quite a different thing, that being an attribute not vouchsafed even to Divinity itself, for we are assured in Holy Writ that the Lord made mistakes and was sorry for them.

Made Ground.

Written for the MINING AND SCIENTIFIC PRESS, by C. H. FITCH.

In my native city in the East, when its population was no more than a twentieth of the present population and some of it was more hog than city, there was a place to which boys could go, and by jumping make the ground shake over a considerable area. This ground is now solid and built over with substantial buildings, having no piling under them, but made in the usual way, with a foot of masonry deep enough to make cellar storage space and get below what is called the frost line.

This change did not come about in my time. It was told me by old men how as boys they used to go to a certain place and make the ground rock. This was in New England, the land of steady habits, where "trembores" and quakings of earth are practically unknown. There were no expensive works of reclamation. Sewerage systems had something to do with it, draining the neighboring land, although made without any idea of solidifying the shaking tract. Another factor in the change was the thickening of what might be called the surface skin by dumping and filling of debris.

In other words, the ground was made solid by a thicker cover less permeable to water, and the water was drained from under that cover. But I do not attribute much effect to the artificial effort of drainage. I consider that the covering did more than the sewerage to make the land hard. Water near the surface, or near enough to it to prevent the formation of a dry and solid shell of considerable thickness must usually be replenished through the surface. At great depths the hydrostatic head may be sufficient to cause a fluid pressure alike in all directions, but near the surface gravitation continually draws away the water. If we roof over a large area, deprived of water the ground under it becomes dry and hard. If we put the roof on the ground so that the surface waters run off instead of penetrating, the ground is solidified.

I have not seen this simple idea of drainage by covering advanced in any technical treatment of this subject.

The next age will not be the age of iron or steel so much as the age of cement. The manufacture of cement and cement-making of materials has advanced enormously of late, and is destined to have a far greater advance. It is an instrumentality in human hands by which man can cope successfully with one of the greatest natural powers of depletion and deterioration—water. It affords a plating which will not rust, which will hold, guide and restrain water where it is of damage to us as in roads, mine shafts and ways and the courses of shifting rivers, such as the Yellow river of China to the restraint of which John Barrett recently invites the attention of American engineers as a problem worthy of their steel.

The point I make and wish to emphasize again and again in the treatment of many such problems is that the practical and available remedy is a skin remedy, impermeability, surfacing and not essentially great depth or bulk of works. This idea is the ruling one for making ground what we require it to be in distributing and bearing weight or lateral pressure, in resisting flow and fluid saturation and in guiding and restraining water courses. In mining works underground these allusions to surface might not seem to apply. They do, however, apply. We can build at enormous expense an enormous honeycomb of timber sets, and this is sure to crush and become racked out of true in time. The only alternative is a system of protected ways and breaking down, sorting and filling with waste in series. In some cases a protecting shield might be used. The substitution of cement lining circular shafts in place of timbering square or rectangular shafts will come in due time. There are a good many places where arched cement work can be used to a limited extent, even if incomplete, as in passing a quicksand or turning the direction of an underground watercourse.

In the construction of the Wachusett dam, a great structure with 2000 feet base in cross section, trenches of 60 feet depth were dug, and from the bottom of these sheet piling was driven to a further depth of 67 feet, trenches being filled with cement. The depth of bedrock was 285 feet. It will thus be seen that the engineers, contrary to scripture, were building not only their house, but a huge dam 65 feet in height upon the sand, and every step was carefully considered, over a thousand borings being made, and the flow of water through the strata of sand being tested and found practically nil.

I never heard of mining operations being facilitated by the interception of flow through a previous stratum of ground to save pumping and dewatering, and make the mining ground more easy to work in the block irrigated by this stratum. It might be done, however, as a watershed, that would be effective over a limited area.

In the "Black Belt," south of Selma, Alabama, the roads get almost impassable in the wet season. I have been told of a case in which a yoke of oxen got mired and was left to perish like those prehistoric animals whose remains indicate that they were mired

in bogs before the dawn of human history. In the dry season these same roads are hard and smooth as a floor. To make a road for such a country that would be good in the wet season I would not attempt any depth of foundation, but simply provide a surface impervious to water and of the greatest practicable breadth. Any opportunities for draining off excess of water might be availed of, but in the absence of possible drainage, a road impervious at the surface and protected by side trenches providing for thin walls of cement would be like an inverted cup which could not be water-filled from below, hence would remain dry and hard. Under cement walks laid in my neighborhood which is a wet region, not much above the level of Lake Michigan, I find that the ground is dry to some depth. Water cannot flow up under such surfaces without displacement, and the movement is very slow. At depths under some pressure, where water is drained out the voids close and capacity for holding water is also reduced.

A neighbor who had a fine oak tree put a beautiful 6-foot cement walk around it at a cost of 16 cents a square foot. He might have girdled it cheaper, as next season the tree, like the old mistress in the plantation song, "died all over." ("When she lived, she lived in clover; when she died, she died all over.") Abundant rains could not reach the roots of that oak parched under the roof provided for them.

Another surface consideration is frost. An excuse for giving a few feet depth and putting in a masonry plug to abut against the soft ground is found in getting below frost line, as though there were a set frost level. Protection from frost, however, should take into account that it requires water, and usually movement of air, to make frost. I have measured a frost growth $2\frac{1}{2}$ inches high growing out of a clod (by condensation and cooling) like a stalagmite. A man had a windmill house, on the lower floor of which he stored potatoes. Frost never touched them. But he fitted up the floor above, and put a stove there, and the next winter everything below froze. The stove drew air from below, and this was replaced by cold outside air, and as far as this movement went there was a severe frost. A dry impervious covering is very effective in resisting frost.

I think, in the articles of which this is the third, that I have made out a good case for flat superficial blanket foundations. I was looking to-day at some foundations where I could see the work in progress far below me. There was a little pile-driving machine, and about two dozen piles for a soft spot, and some blocks of stone looking in distance about the size of pebbles, while the piles looked about the size of toothpicks. They stuck in these toothpicks, laid the pebbles upon them, and will build upon this foundation. This, mind you, is for a Chicago high building. Even where cement is used, as in the Marshall Field building, it is put down in a form like wooden piles. The wonder is that a flat distributing thickness of cement is not used instead of piles or piers of any kind. (Note article on Modern Building Foundations in MINING AND SCIENTIFIC PRESS, Sept. 21, 1901).

Liability of Mine Employer.

Concerning the editorial in last week's issue regarding injury to miners by accidents and the deplorable results therefrom, the following is given:

Two miners were employed at the bottom of a shaft. There was an elevator in the shaft, and when about to hasten they gave the signal to the engineer, who signified that he understood, by raising the bucket a few feet and then lowering it. Then they ignited the fuse and signaled the engineer to hoist, and were raised a short distance and then lowered, and the engineer shouted down the shaft that the compressed air by which the elevator was raised was cut off. One of the miners climbed up the elevator and escaped; the other could not do so and was killed by the explosion. The air was cut off by the foreman, who had full charge of the operation of the mine. There had been an iron chain ladder in the shaft, which was removed some weeks before the accident, to be replaced by a new chain ladder, which was on the ground and was to be placed in the shaft that day. It was held that where a corporation owning two mining plants has a general superintendent, with general oversight over both plants, and a foreman of each mine, who employed and discharged the men, and who directed and controlled the entire operation of his mine and of the various gangs of men there employed, such foreman is a vice-principal, for whose acts and negligence in the conduct of such mine the owner is responsible.—*Alaska United G. M. Co. vs. Muset* (114 Federal Reporter, 66), U. S. Circuit Court of Appeals, District of Alaska.

SCIENCE is not essential to the successful prospector, but he ought to be able to determine the nature of the more common ores in order to work intelligently. Those that should be studied to some degree are gold, silver, lead, iron and copper. Each of these when scratched with a knife or other instrument will expose a streak of bright metal, and to determine the character of the ore, if not the value, is of much importance to the prospector; however, many men, wholly uninformed, have met with suc-

cess. Geology is better learned in field work than from books, if the prospector is observing and analyzes the different rocks which he may discover. To do this a few chemicals or acids are needed, the use of which he may learn quickly. Every man knows granite from porphyry or lime from quartz. Feldspar is nearly like quartz, and may be determined from quartz by a smooth surface when taken from a vein. Talc is a soft slippery rock something like mica or packed clay. Calcite subjected to an acid test will dissolve or effervesce and is an element of lime. Dolomite, or carbonate of lime and magnesia, resembles calcite. It is a character of limestone. Gypsum is a sulphate of lime and is difficult to determine from its hardness. It may be scratched by the finger nail, and it will not scratch copper. Garnets are usually found near copper; they are of a reddish color and rather tend to be in cubes in the rock.

A New Explosive.

While attempting to find a flameless explosive F. L. M. Masury of New York discovered a compound which is receiving considerable present attention. In addition to being flameless, it is reported to possess other essential requirements for safety and efficiency. Some recent tests of this new high-power explosive compound were made by mining engineers on the grounds of the inventor at Sands Point, Long Island, N. Y., which, according to apparently authentic published reports, showed that this new substance is of economic value to miners. The extraordinary claim is made that while it possesses all the explosive powers of dynamite, it can be carried and thrown about like so much sand. The substance has been called "masurite," after its inventor, Mr. Masury. It is a light yellowish powder, granular, and somewhat resembling fine sand in appearance. Heat, cold or moisture are said to have no effect upon it, though continued contact with water tends to its deterioration. The heat of an ordinary flame will fuse it, but in melting it loses its explosive properties. By itself it will not burn, but slowly consumes when brought in contact with carbonaceous materials. It weighs about one-third less than equal bulk of dynamite and costs about the same as 40% dynamite. It is manufactured by the Masurite Explosive Co., 50 Broadway, New York City, represented on the Pacific coast by G. W. Myers, 417 Hayward Building, San Francisco, Cal.

In the tests referred to the following is furnished as a resume thereof:

In the concussion test the masurite was placed on an anvil and struck with a hand hammer and with a sledge without effect. An iron ram weighing sixty pounds was dropped 25 feet on a ten-ounce paper cartridge, filled with masurite, placed on an iron anvil. The blow compressed some of the powder into coherent cakes, but had no further effect. Twelve-pound tin cans filled with masurite were perforated with shots fired at close range from a 30-40 rifle, using both mushroom and steel-jacketed bullets, without effect on the explosive. The same result was obtained when burning brands of charcoal were placed in the powder and shots fired through the partly burning mass.

In heat, fire and electric spark test iron bars heated to redness were run through cartridges filled with masurite or used to stir the powder in a ten-pound can; portions of the powder fused and burned, the latter where in contact with the paper of the cartridge. Quantities of masurite were thrown upon a wood fire, also upon a charcoal forge fire blown vigorously. The substance was fused where the heat was sufficient, and burned where in contact with the coal. Smokeless powder and high-grade black powder were placed in intimate contact with portions of masurite and set off by a fuse. The masurite was not affected. A melting pot was filled with masurite, covered with an iron funnel; the pot then heated on a forge fire until the masurite melted and decomposed. The fumes passing off from the funnel could not be lighted, but extinguished the flame of a match. When masurite was rubbed between surfaces covered with sandpaper or emery, no effect was produced. Quantities of masurite were heaped upon an iron rasp connected with a 110-volt generator, and a wire connected to the other terminal was rubbed over the rasp. The electric sparks did not affect the powder. A copper wire was placed in a heap of masurite and a 110-volt current passed through; the wire was fused, but the powder was not affected.

In the detonation test a ten-ounce cartridge of masurite was fitted in the ordinary manner with a double strength electrical exploder, the exploder being placed in one end of the cartridge. The cartridge detonated violently. A similar cartridge was fitted with a similar exploder tied on the outside; the cartridge exploded as before. Half a cartridge of 40% dynamite was detonated at a distance of 12 inches from a cartridge of masurite without exploding the latter, but merely breaking the cartridge. A masurite cartridge when set off at a distance of 12 inches from a dynamite cartridge caused the latter to detonate. In this test the dynamite gave a bright burst of flame when exploding, in all the explosions of masurite no sign of flame appeared.

To show the effect of cold on the masurite a cartridge was placed for three hours in a can surrounded

by a freezing mixture. When the cartridge was taken out of the can a thermometer in the can showed a temperature of 6° F.; the cartridge was immediately fitted with a fuse and exploded, the same as the other cartridges which had been fired at normal temperature.

Relation of Rainfall to Runoff in California.*

A study of the available rainfall and runoff data for California watersheds has been undertaken and the accompanying diagrams and tables are here presented as the result of this work.

As the runoff diagram was to be used in estimating

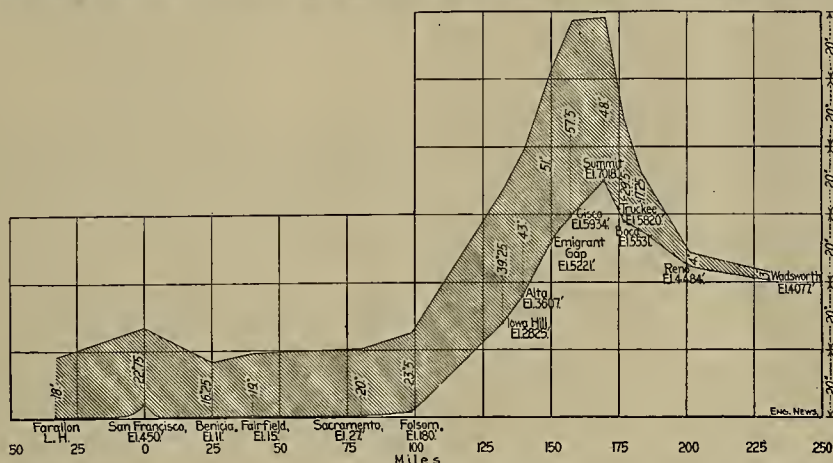


Diagram Showing Increase of Rainfall With Rise in Elevation Over the Sierras in Central California.

the water supply available for various storage reservoirs for irrigation, it was thought best to represent the runoff in acre-feet per square mile. The majority of the discharge reports give the depth of runoff in inches. The accompanying table has been made for converting depth of runoff in inches to runoff in acre-feet per square mile, using the following formula: Depth of runoff in inches $\times (0.0833 \times 640) =$ runoff in acre-feet per square mile.

TABLE FOR CONVERTING DEPTH OF RUNOFF IN INCHES INTO ACRE-Feet PER SQUARE MILE.

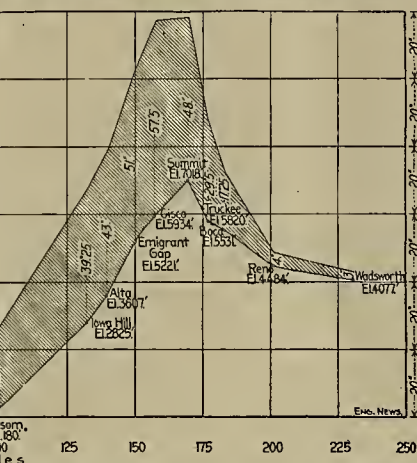
Depth of runoff, Ins.	Acre-ft. per sq. mile.	Depth of runoff, Ins.	Acre-ft. per sq. mile.	Depth of runoff, Ins.	Acre-ft. per sq. mile.
.01	.533	.35	18.667	.69	36.800
.02	1.067	.36	19.200	.70	37.333
.03	1.600	.37	19.733	.71	37.867
.04	2.133	.38	20.267	.72	38.400
.05	2.667	.39	20.800	.73	38.933
.06	3.200	.40	21.333	.74	39.467
.07	3.733	.41	21.867	.75	40.000
.08	4.267	.42	22.400	.76	40.533
.09	4.800	.43	22.933	.77	41.067
.10	5.333	.44	23.467	.78	41.600
.11	5.867	.45	24.000	.79	42.133
.12	6.400	.46	24.533	.80	42.667
.13	6.933	.47	25.067	.81	43.200
.14	7.467	.48	25.600	.82	43.733
.15	8.000	.49	26.133	.83	44.267
.16	8.533	.50	26.667	.84	44.800
.17	9.067	.51	27.200	.85	45.333
.18	9.600	.52	27.733	.86	45.867
.19	10.133	.53	28.267	.87	46.400
.20	10.667	.54	28.800	.88	46.933
.21	11.200	.55	29.333	.89	47.467
.22	11.733	.56	29.867	.90	48.000
.23	12.267	.57	30.400	.91	48.533
.24	12.800	.58	30.933	.92	49.067
.25	13.333	.59	31.467	.93	49.600
.26	13.867	.60	32.000	.94	50.133
.27	14.400	.61	32.533	.95	50.667
.28	14.933	.62	33.067	.96	51.200
.29	15.467	.63	33.600	.97	51.733
.30	16.000	.64	34.133	.98	52.267
.31	16.533	.65	34.667	.99	52.800
.32	17.067	.66	35.200	1.00	53.333
.33	17.600	.67	35.733		
.34	18.133	.68	36.267		

At the outset many difficulties began to present themselves. The most serious one was that of obtaining measurements of rainfall at the higher elevations. The streams most productive of runoff, and upon which discharge records had been kept, have their sources on the western slopes of the high Sierra Nevada mountains, where there are few or no inhabitants above 7000 feet, and consequently no observers of rainfall, but the valuable rainfall records of the Pacific Railway system along the line of railway from Sacramento to the summit of the Sierra Nevada at Railroad Pass offer a clue to solution of this difficulty. In the diagram the mean rainfall and the elevation of the station are plotted as ordinates and the distance inland of the station as abscissas.

The rate of increase of precipitation from Sacramento to Cisco, at the elevation of 6000 feet, the point of maximum rainfall, seems to be 0.6 inch per 100 feet of rise. The precipitation above the 6000-foot point decreases with the elevation approximately at the rate of 0.4 inch per 100 feet of rise.

*J. B. LIPPINCOTT and S. G. BENNETT in Engineering News.

Fortunately, in the Tuolumne river basin, about midway between the American and the Kings river basins, there is another series of rainfall stations, beginning with La Grange, elevation 293 feet above sea level; Sonora, elevation 1824 feet; Second Garrote, elevation 2900 feet, and Crockers, elevation 4453 feet. The mean rainfall of these stations plotted as in the above diagram indicates the rate of increase from La Grange to Crockers to be 0.84 inch per 100 feet of rise. This rate of increase has been taken to hold good up to an elevation of 6000 feet, and above this the rate of decrease of rise to be 0.4 inch per 100 feet to an elevation of 9000 feet. Probably the rate of increase and decrease would be more correctly represented by a curved line, but the data are not sufficient to warrant this.



Using these rates of increase and decrease, the mean precipitation for the years 1896-1899 at an elevation of 9000 feet in the Tuolumne river basin would be 49.8 inches; if snow converts into water at the ratio of 8 to 1, the snowfall would be 33.2 feet at this elevation.

It was found impossible to use the runoff data of the Kern river basin, though it is without doubt the most closely watched stream in the State, and the record is the oldest for any largest stream in the State, because of the exposure of the watershed and because of the scarcity of rainfall data. This watershed is bounded on the west for almost its entire length by a high mountain range. Concerning the precipitation on the east slope of this range there is little known beyond the fact that it is very much less than on the western slope.

In 1896 the total runoff from the Kings river basin of 1775 square miles was 1,871,005 acre-feet. For the same period the runoff from the Kern river basin was 619,630 acre-feet. The ratio of the area of the Kings river basin to the Kern is 1 to 1.32, the ratio of runoff 1 to 0.33, though the higher drainage areas of the streams are contiguous. It was also thought best not to use the runoff and rainfall data for Piru creek basin, furnished by the Antelope Valley Water Co., because the ratio of discharge in acre-feet per square mile was greater than any other record. There is little doubt about the accuracy of both the runoff and precipitation records, the explanation being that the rainfall observation stations were necessarily situated at so low an elevation that the record did not represent the mean rainfall for the higher portions of the basin.

SACRAMENTO RIVER BASIN.—The rainfall stations used in determining the mean annual precipitation for the Sacramento river basin were the following: Red Bluff, Rosewood, Redding, Delta, Dunsuir, Shasta, Sissons and Fort Bidwell.

There were absolutely no records for the great interior mountainous and lava country in Siskiyou, Modoc and Lassen counties, comprising more than 5334 square miles of the watershed.

Fort Bidwell is situated outside of the watershed, on the eastern slope of the mountains that form the boundary, and would probably have a less rainfall than Modoc county. The record was kept there for a period of 22 years, and the mean rainfall is 20.8 inches.

The average rainfall at Red Bluff for a period of 23 years, was 23.9 inches; at Rosewood, for a period of 6 years, 25.63; at Redding, for 24 years, 35.69. The precipitation of these three latter stations was taken to get the average for the Sacramento valley for the years 1896-1899, during which runoff measurements have been made at Jelly's Ferry. The mean rainfall of the Pitt river drainage area of 5334 square miles, which has an average elevation of 5000 feet, was taken to be the same as that of the Sacramento basin above Red Bluff.

The average rainfall at Delta for a period of 14 years was 62.39 inches; at Dunsuir, for 10 years, 57.16 inches; at Shasta, for 6 years, 53.26 inches; at Sissons, for 10 years, 32.75 inches. The rainfall at these four stations was taken to obtain the mean rainfall for the mountainous area of the watershed for the years 1896-1899.

Mexican Mining Notes.

[FROM A TRAVELING CORRESPONDENT.]

Sonora, District of Moctezuma: The Copper Queen M. Co. of Bisbee, Ariz., are going to erect at Douglas a 1000-ton smelter. Douglas is the terminus of the extension of the Arizona & Southeastern Railway which the Copper Queen people are building to their copper mines at Placeritas de Nacosari. Much of the copper treated by the new smelter will come from Sonora. Both the Cobre Grande in the Cananea and the Nacosari mines may rival the Copper Queen in the production of copper in a few years. The Guggenheims worked the old Nacosari mines for some time, but owing to not having the facilities for treating the ores at that time their results were not satisfactory. The Copper Queen Co. purchased the mines for \$250,000 and expended \$2,000,000 in development work and a new smelter. To-day the Nacosari mines lead in the production of copper in Sonora. With American capital, coupled with the same energetic development work which has been characteristic of the managements of the Nacosari and Cobre Grande properties, other Sonora copper mines can be made as productive.

The extensive copper belt of eastern Sonora runs the entire length of the State. In the northeastern section the belt lies in the porphyry next to the conglomerate which forms the country rock cut by the barrancas of the Rio Yaqui. In the Free Zona, about 30 miles southeast of Bisbee, are the Caballona and Kirk Bros.' copper mines. Farther south and east of Fronteras are a number of old copper workings. East of the Sierra Pinitos, on the southern border of the Free Zona, copper exists, together with rich gold and silver mines. East of the smelter at Placeritas de Nacosari are copper mines assaying high in gold and silver, such as the Monton de Cobre, Wene and San Francisco properties on the Arroyo del Los Alisos. The eastern slopes of the Haucal and Joriquita mountains also contain promising copper prospects. All of these claims lie adjacent to the railroad which the Copper Queen Co. are building to Placeritas de Nacosari.

In the Cerro Pinto country the copper exists in the granite, which formation runs east and west, and also forms the country rock of the mountains east of the Rio Yaqui and north of the Pueblos of Nacori and Bacadehuachi. East of the silver camps of Lampazos copper can be found outcropping between the lime and conglomerate. West of Sahuaripa the copper belt is cut by the Rio Yaqui, after which it runs through the Alamos district, where copper is found all along adjacent to the contact of the porphyry with the granite.

The gas engines with which Phelps, Dodge & Co. have been operating their smelter at Placeritas de Nacosari have proven such a success that they have contracted for 1400 H. P. to furnish power for their smelter at Morenci, Ariz., and Placeritas. The company manufacture their own gas, both from wood and coal.

Sinaloa, District of El Fuerte: A. E. Stilwell, the promoter of the Kansas City, Mexican & Orient Railway, says he has assurances from English capitalists that they will take all the necessary stock for building the road. No bonds have as yet been issued.

District of Sinaloa: The gold mining camp of San Jose de Gracia is on the Arroyo de San Jose, a tributary of the Rio Sinaloa. Some years ago San Jose was the leading gold producing camp in Sinaloa and one of the most lively in the Republic of Mexico. Its population was cosmopolitan. Europeans, Americans and Chinese worked the productive quartz and placer mines, while the Mayo and Tarahumari Indians performed the outside work and acted as arreadores with the large pack trains from Chihuahua and points on the Pacific coast. Cock-fighting and other games flourished, and gold dust acted as legal tender with the silver "dobes" of the realm. To-day San Jose has much the same appearance as a silver mining camp in Nevada. About ten months ago the big American company concluded cyaniding their mill tailings, and nothing has been done ever since. But while the plants of the big companies are lying idle the gambusinos and placer miners are bringing in some gold from the surrounding territory. During the dry months of the spring and early summer the Arroyo de San Jose is available for placering down to its confluence with the Rio Sinaloa. Aside from the temperature and the difference in the fauna incidental to the latitude San Jose reminds one of Ouray in Colorado. The formations have the same rich coloring, and the breccia is scattered profusely in the higher sections of country. Five miles northeast from San Jose is situated the mine and real of Rosario. This property is mined and owned by Mexican mining men. A 25-stamp mill is in operation crushing the ore. The company have finely constructed office and store buildings. A pipe line furnishes sufficient water for the real and the mill. The ore is rich, some pieces being covered with "chispas de oro," or nuggets of gold. Further east is the San Tomas mine, which is being worked with good results. A strike has lately been made about six miles from Rosario on the San Jose and Calahasios trail. It runs high in gold.

Chihuahua, District of Guadalupe: The Calahasios mine, lying east of San Jose toward Guadalupe

Calvo, has produced over \$2,000,000. The ore is a black-jack of lead, some of it carrying free gold.

District of Morelos: Messrs. Sheldon, Wood & Noble are operating the old Bellahuaque mine, which is situated 2 miles south of the old real of Los Tajos, near Morelos. This property consists of ten pertenencias of land and has values in gold, silver and lead. The owners have driven a tunnel to tap the antiguo workings at a depth of 300 feet. The tunnel has a depth of 150 feet, all in ore. Further south the same parties have denounced the Carmen, a gold proposition of five pertenencias of land. Five miles west of Los Tajos is situated the Rosario mine, which has produced half a million dollars in silver and lead. It consists of 10 pertenencias and is owned by Mexican mining men. Four hundred feet of tunnel work was recently performed to tap the old shaft workings. Negotiations are pending between the owners and Sheldon & Co. for the purchase of the property. The real of Los Tajos is one of the antiguo mining towns, and an immense quantity of lead and silver has been produced in its vicinity. Until the advent of Americans the mines were mostly lying idle, owing to the necessity for more modern methods of treating the ores and working the mines to a greater depth. The country around Los Tajos has been worked extensively by the gambusinos, or small chloriders, who extract the rich surface ores without the formality of denouncing or surveying according to law.

Production of Petroleum.

In his report on petroleum in "Mineral Resources of the United States, 1901," now in press, published by the United States Geological Survey, F. H. Oliphant notes that the production of crude petroleum was greater than that of any previous year; and that there was a very remarkable increase in the production in the States of Texas and California, a decrease in the production of the Appalachian or Eastern petroleum fields, and a slight gain in the output of the Lima-Indiana region. The total production of crude petroleum in the United States in 1901 was 69,389,194 barrels, being larger than that of any previous year. It was larger by 5,768,665 barrels, or 9%, than the production of the year 1900. The increase in the production of 1900 over 1899 was 6,291,854 barrels, or 11%, and the increase in 1899 over 1898 was 3%, or an average gain of 7.7% for the last three years. As compared with the value of the total production of 1900, 63,620,529 barrels, valued at \$75,989,313, the total production of 1901, 69,389,194 barrels, valued at \$66,417,335, shows a decline of \$9,571,987. In the order of production Ohio comes first, with over 21,000,000 barrels; West Virginia second, with over 14,000,000 barrels; Pennsylvania third, with over 12,000,000 barrels; California fourth, with over 8,000,000 barrels; Indiana fifth, with over 5,000,000 barrels; Texas sixth, with over 4,000,000 barrels, a loss in production, as compared with 1900, for Ohio, West Virginia and Pennsylvania, and a gain of nearly 4,500,000 barrels for California; of a little over 3,500,000 barrels for Texas, and of nearly 900,000 barrels for Indiana. This production for 1901, by fields, was in round numbers for the Appalachian field 33,600,000 barrels; the Lima-Indiana field 21,900,000 barrels; the southern California field 8,800,000 barrels, and for the Texas field 4,400,000 barrels.

The average price paid for all the petroleum marketed in the United States during 1901 was 95.7 cents per barrel, as compared with \$1.194 in 1900, showing a decrease of 23.7 cents per barrel or 20%, the lowest price since 1898. The gross decrease in value for 1901, as compared with 1900, was nearly 13%, notwithstanding that the quantity increased for the same period a little over 9%. The average price paid for Pennsylvania petroleum, which represents 48.5% of the total production, was \$1.21 per barrel in 1901, as compared with 57% produced in 1900 and marketed at an average price of \$1.356 per barrel, a decline of 14.6 cents per barrel, or 12%. There was a decline of 37.7 cents per barrel in the average price paid for California petroleum, and a decline of 76 cents per barrel for the Texas product in 1901, as compared with 1900—a decline accounted for by the increased production of the new fields developed in both these States. The total number of wells completed in 1901 in the United States in the search for petroleum approximates 14,250, of which 3,220 are estimated to be dry. The cost of these 14,250 wells is estimated at \$21,375,000, approximately one-third of the receipts for the entire crude product. The average price received for all the various grades of petroleum exported from the United States in 1901 was 6.73 cents per gallon, as compared with 7.52 cents per gallon received in 1900 and with 6.83 cents per gallon in 1899. The developments of the oil pools at and near Beaumont, Texas, and in the section surrounding Bakersfield, California, and the developments at Boulder, Colorado, have been the chief causes of the organization of some 1,578 oil stock companies with a capitalization, acknowledged and estimated, of \$669,083,000 in 1901.

The American Smelting & Refining Co. is now shipping 500,000 ounces of silver weekly to Mexico to be coined. It has contracted to ship 5,000,000 ounces and expects to ship 10,000,000 more.

Liquid Fuel--Boiler Firing With Oil.*

By JAMES W. WARREN.

The chemical composition of liquid fuel and its calorific value as compared with that of solid fuels have been so ably presented in various papers that it is hard to find an opening to introduce new matter on this very important subject.

The State of California, while prolific in natural resources for the support and comfort of mankind, is a little shy on coal; but, though lacking the solid carbon, we are blessed with an increasing volume of hydrocarbon, and the daily uncovering of new oil-producing fields in southern California assures the steam user of an abundant supply of liquid fuel. Not alone on terra firma is the rhythmic hump of the oil well drill heard, but on the bosom of the Pacific the drill goes down into the bed of the old ocean, and, tapping the oil strata, we draw from under the mighty deep millions of gallons of liquid fuel.

The discovery of liquid fuel in such large quantities in southern California has made its use general for all manufacturing purposes, also for the burning of brick, oiling roads to subdue the dust, for smudge fires to temper Jack Frost, for malt houses, for all steam railroads in southern California, and for crematories.

The petroleum oils of southern California are of an asphaltum base and carry with them about 30% of asphalt. There being little paraffin and a comparatively small amount of illuminating oil in their composition, distillation is not as general as with Eastern petroleum. The greater amount of distillation of the local petroleum is for the large quantities of asphalt it carries, this asphaltum finding a ready market here and in the Eastern States.

The liquid fuel from our local oil fields is pumped from wells within the city limits. These wells average 1000 feet in depth. The oil carries in suspension considerable sand and water, for the removal of which storage and heating are required. This oil is delivered to consumers in tank wagons of about twenty-barrel capacity. When the oil is delivered to the consumer a sample is taken from the wagon and tested for temperature, gravity and percentage of water. The average temperature is 70° F., the average gravity 15° B., and the average percentage of water about 6% of the load in the wagon. The method of determining the amount of water in the oil is by the gal-o-line test. This test is made with a test tube holding 100 cubic centimeters and graduated in one-hundredths. The tube is filled with 50 cubic centimeters of the oil test and 50 cubic centimeters of gasoline. By agitating the mixture thoroughly the gasoline cuts the envelope of oil that surrounds the globules of water in the oil, allowing the water to precipitate itself to the bottom of the tube. The percentage of water that gathers in the bottom of the tube determines the percentage of water in the load, and deductions are made accordingly.

The low gravity and high flash test of the local oil make it perfectly safe for use under boilers and in storage. Loss by evaporation, due to exposure to the heat of the sun, is comparatively small.

The method of bandling the liquid fuel at the generating station of the Los Angeles Electric Co. is as follows: The fuel is pumped from the main storage tank to the main furnace supply tank of 100 barrel capacity. In this tank the oil is heated to 80° F. It then passes to a pair of small duplex steam pumps, which give it twenty pounds gauge pressure. The oil then traverses pipes within the breeching of the boilers, which heat it to 190° F., then on to the burners. The burner is of the spray type, using steam as the medium of spraying the oil. These burners consist of two circular discs, 1½ inch in diameter, slotted and arranged in such manner that the oil, fed by separate pipe to the lip of the upper disc, meets the steam at its orifice just under this lip. This steam forms a fantail spray which breaks up the oil into particles sufficiently small to ignite immediately by the heat of the brick lining of the furnace and the layers of bricks upon the grate bars. Each one of these burners has an evaporation efficiency of 3000 barrels of water per hour from and at 190° F. The sound of combustion produced by these burners is comparatively soft. The flame fills the furnace box, covering the entire furnace box sheets of the boiler. This gives active beat action to all of the evaporative service of the fire sheets without unduly heating any one particular portion, and, at the same time, perfect combustion is taking place, as denoted by the absence of any colored gases leaving the stack.

If economy in the use of liquid fuel is to be considered, a high temperature thermometer in the smoke stack is as necessary as a water gauge glass on a boiler, for by the thermometer only can the fireman graduate the amount of air necessary for perfect combustion. As a test of this, our fireman can raise the temperature of the gases in the stack from 450° to 600° F. by closing the asphalt doors 1 inch. By the use of the thermometer the fireman can so regulate the burners under each boiler that it will do its proportionate amount of work. This is very essential in plants working many boilers set in batteries. It is

* Read before the National Electric Light Association at its twenty-fifth convention held at Cincinnati, O., May 20, 21, 22, 1902.

an important point that the evaporative efficiency of the burners should be kept as high as possible; that is, the burner that consumes 5% of the steam which it evaporates should not be allowed to consume 20%, which it might do if not judiciously controlled.

In summing up the advantages of liquid fuel over solid fuel for steam generating plants, we obtain the following:

- Concentrated form.
- Economy of handling.
- Increased evaporative efficiency.
- Cleanliness.
- Abatement of smoke nuisance.
- Reduction in depreciation account.
- Reduction in repair account.
- Reduction in sundries account.
- Efficiency in emergency.

In considering the comparative storage area required for coal and for the equivalent amount of oil, taking yard storage as a basis, 40% less area is required where oil is used. In the floor area of the fire room 50% less area in front of the boilers is required when oil is used as fuel. In economy of handling, the complement of boiler room help is reduced fully 50% and the transportation of ashes is entirely eliminated.

The evaporative efficiency of oil as compared with the same weight of our average good steam coal is 28% bigger than that of the coal.

In making a comparison of the cleanliness in the use of oil as against coal, and the saving gained, the advantages are so far-reaching in the minor items that only a few of the larger savings will be touched upon. There is a saving of 75% in the cost of paint, waste, brooms, tube cleaners, etc., required in the everlasting removal of coal dust, dust from ashes, soot, etc.

The use of liquid fuel solves the smoke problem, as smoke issuing from a stack where oil is used for fuel is an evidence of improper combustion, and can be avoided.

The use of liquid fuel reduces the deterioration of steam generating apparatus 25%. This is effected by the even fire of fuel oil, there being no undue strains on the fire sheets, caused by the frequent opening and closing of fire doors, as in the use of coal. The absence of large amounts of sulphur in oil prevents those chemical combinations which so rapidly corrode the tube ends. Ashes, lodging in obscure places and inaccessible corners of the boilers, absorb moisture and form a strong chemical affinity for the parts of sheets with which they come in contact, causing rapid corrosion.

As to the reduction in repair account, the cost of renewing the lining of furnaces, renewing grate bars, bridge walls, back arches, etc., is reduced 80% by the use of liquid fuel.

In the reduction of the sundries account the items of coal scoops, slice bars, hoes, firing irons, tube scrapers, wheelbarrows, water hose, steel brooms, wood for starting fires, etc., are entirely wiped out when liquid fuel is used.

In the use of liquid fuel the engineer has an able assistant to help him out in case of an emergency call upon his boilers. If required to raise steam rapidly he can do so without endangering the burning out of his boilers as greatly as when coal is used. On the other hand, if for any reason it is necessary to shut the fires off immediately it can be done without the annoyance and danger of pulling out a heavy fire from the furnace.

In conclusion, the record of results obtained from the use of liquid fuel in southern California stands out so prominently in liquid fuel that many of the larger steam generating plants in the northern part of this State have abandoned the use of coal in favor of liquid fuel. Its simplicity in operation and control and the low cost of installation make it a desirable factor in the economies of a steam plant.

Copper Converters.

A converter plant, as generally known in this west half of America, is for the purpose of converting copper matte, which usually carries about 50% of copper, into pig copper that is within 2% or 3% of being chemically pure. Some plants go a step further by reducing a portion of the copper to a still higher grade, in the form of anode plates for the refinery.

The converter is a large movable iron vessel not unlike a huge jug open at the top. This is lined with a thick coating of well ground silica, which consists mainly of oxygen. Into this converter is poured the molten matte, which is from 50% to 54% copper, perhaps 25% or 30% sulphur, the remainder consisting of iron and other impurities.

Into this molten mass a current of air is turned, the oxygen of which, uniting with the sulphur, keeps up and intensifies the combustion, the oxygen of the air being reinforced from the silica lining. When the charge has reached a certain stage indicated by the color of the fumes and setting metal, the converter is tilted over by machinery and the iron and other impure matter floating upon the surface are run off into pots, and, cooling, form slag. When this is substantially all removed a forced draught of compressed air is turned on, and the sulphur itself is blown away in the form of vapor or fumes. The copper remaining is then drawn off into molds, and constitutes

what is commercially known as pig or blister copper.

The slag referred to contains a small percentage of copper, and in order to save this it is remelted in the blast furnace and goes again into the form of matte, when the converting process is repeated.

Some works turn out 250 tons of copper each twenty-four hours. Of this, about one-half is sent East in the form of pigs for refining, the other half remelted in the tilting furnaces and then cast into anode plates for refining locally. In the tilting furnaces the copper undergoes further chemical changes, getting rid of small quantities of foreign matter and being put into better shape for refining.

At a plant of any note there are from five to fifteen converter stands and from two to four tilting or refining furnaces. There are also four to six blast furnaces, each of 200 tons a day capacity. The blast furnaces take the better class of ores, melt them, run off much of the impure matter and form matte, which is then treated in the converters, the slag referred to being melted in the blast furnaces along with the ore.

To Dissolve the Smelter Trust.

Proceedings on behalf of the State of Colorado to dissolve the smelter trust were started in the Supreme Court at Denver July 1. Colorado complaint, filed by the attorney general, sets forth that the American Smelting and Refining Co. and several other smelter concerns are in a combine to restrict competition in the smelting business; that the results of the monopoly are injurious to the industries of the State; that it is violating the laws, and that it is paying unreasonable dividends upon excessive and fictitious capitalization.

The complaint concludes with a demand that the defendants be adjudged to have forfeited their rights to do business in Colorado, and that they be ousted and forever excluded from doing business in the State, and that a receiver be appointed to take charge of their property.

The court stated that in fairness to the defendants they should receive notification of the suit, and therefore the filing of the proceedings was withheld until they can be informed of the contents of the attorney general's complaint.

The hearing of the State's right to proceed with the suit will probably be set for to-day.

The defendants in the case are: The American Smelting & Refining Co., the Omaha & Grant Smelting Co., the Pueblo Smelting & Refining Co., the Bi-Metallic Smelting Co., the Colorado Smelting Co., and the Philadelphia Smelting & Refining Co.

The complaint recites the facts of the formation of the trust in New Jersey with a capital stock of \$65,000,000, and adds:

That said American Smelting & Refining Co. was organized by the aforesaid defendants for the specific and deliberate purpose of creating a monopoly of the business of smelting and refining gold and silver and other valuable ores and metals, as aforesaid, and to substantially egress the same, contrary to the public policy and the laws of the State of Colorado.

Subsequent to the incorporation of the American Smelting & Refining Co., it is alleged, this company unlawfully conspired with and induced the other defendants to transfer to it all the plants in the State for a consideration of \$65,000,000, each concern to receive its pro rata share. The Philadelphia smelter at Pueblo, it is said, was conveyed to the trust for \$35,000,000 in stock of the American Co.

Then follows an arraignment of the company's methods, particularly excessive charges "for the smelting and reduction of the gold and silver ores which are shipped to it by the people of said State," conniving with railroads to destroy competition, and "wrongfully keeping back for its own uses the difference between the published freight rates and the said secret rates wrongfully secured by said American Smelting & Refining Co. as aforesaid."

The trust now refuses to receive for smelting all of the gold and silver ores offered to it by the citizens of Colorado, it is stated. It is further stated:

That said American Smelting & Refining Co., in order to further carry out its said conspiracy and unlawful monopoly, and in disregard of its public duties and obligations, has shut down and dismantled divers of its smelting and refining plants, to the great injury of the public said American Smelting & Refining Co. was supposed to serve. That said plants were prosperous-going concerns prior to their conveyance to said American Smelting & Refining Co., as aforesaid, and would, but for said conduct of said American Smelting & Refining Co., be prosperous and go on concerns to this day.

Further on in the complaint it is alleged:

By reason of the awe which said American Smelting & Refining Co. has inspired in the hearts of the railway managers of the State of Colorado, thereby securing secret and more favorable freight rates than are enjoyed by the general public of the State, as aforesaid, and by reason of the extortionate and unreasonable charges demanded and received from the people for the smelting and reduction of their ores as aforesaid, the said American Smelting & Refining Co. has been enabled to pay, and does now pay, excessive and unreasonable dividends upon an enormously excessive and fictitious capitalization of \$100,000,000.

Hoisting Works for Deep Mines.

NUMBER II.

H. G. Graves said it seemed to him that this problem of deep winding was simply one of speed. They had the stuff in the mine, and it had to be got out somehow; with that end in view it ought to be lifted straight away from the bottom to the top without any intermediate stops whatever. The whole problem was very much akin to that of rapid transit by electric or other railways where passengers wanted to get out of town to the suburbs and from the suburbs to the town by express trains. He thought, therefore, single lifts could only be taken into consideration. The strength of the wire rope did not affect the matter, as wire ropes could be built of any desired strength to carry any desired load. Practically at the present moment, with the improved manufacture of steel, he thought there would be no difficulty in getting what they wanted in the future. Accordingly, if they took speed as the sole object to be obtained in winding, they wanted to load at the bottom and to uncage or discharge at the top with the greatest possible rapidity, and that could only be obtained by self-loading and unloading skips or by uncaging apparatus. The speed during the wind must be as great as possible, or in other words, the acceleration must last the least possible time. The earliest point at which the greatest speed was to be obtained during the wind was not settled by any means; but by improving the guides, by using wire rope guides and by carefully arranging the slippers that slide on them, the speed might be increased beyond what it at present was. The only thing that remained was the acceleration. The speed had to be raised during the first five or six seconds of the wind up to its maximum, and for that purpose the weights to be moved must be balanced as far as possible. The energy imparted to the moving mass to bring it to its maximum speed was dependent upon the square of the velocity multiplied by the weight in motion and upon the unbalanced load multiplied by the height it was lifted. The total weight, and more especially the unbalanced load, must be reduced as far as possible in order to reduce the horse power. In one particular case, where 1200 tons were lifted 420 yards (that was quite a small lift, but it happened to be one in his mind), the difference in the horse power of the engine produced by putting on a tail rope was no less than 11%, 674 H. P. being required in one case and 749 H. P. in the other. The balancing was absolutely necessary, and the reduction of the weight was equally necessary. With an 18-foot drum, weighing twenty-five tons, for example, the mass that was to be put in motion was twice, or sometimes nearly three times, as much as the total weight of the rope, cages and the paving load lifted. To get that into motion absorbed a proportional amount of power. Of course, the energy was given up at the end of the wind during the retardation, but they could not afford the time to let the load come to rest of itself. They must put on the brakes so as to reduce the time, and they must have as light a weight as possible to start and stop. To reduce the weight they must have recourse to the lighter drums that were used in the Koepe or the Whiting systems.

R. James said that more than twenty years ago it was decided by old and experienced mining men who had been working the ore at the Comstock, that to have hoisting at a rapid rate, to have a single hoist was far superior to having a two-stage hoisting system. At that time there were shafts down to 3000 feet, and there was very little difficulty in constructing engines and manufacturing ropes to suit the purpose, and he might say that those engines were constructed for 2500 feet twenty-two years ago. Upon page 1 of Mr. Behr's paper he found that reference was made to the abandonment of two-stage hoisting on the Comstock—viz., vertical and incline (both being operated from the surface at the Savage mine)—on account of the expense. The mine referred to as working round taper ropes for the incline or second stage would be the Ophir mine on the north end of the lode. The Sutro tunnel, which tapped the Comstock lode at a depth of 1650 feet, did not reach the mines at that level until the bulk of the ore had been mined 100 feet below that point; after that sinking was resumed at most of the principal mines, and in the early eighties the actual depth attained at the Combination, a joint winding and pumping shaft, exceeded 3000 feet. No difficulty was experienced in winding rapidly (on his firm's direct lift). The method adopted was: Flat plaited, stout wire ropes, hemp hearts, 5 inches wide and, he thought, $\frac{3}{8}$ inch thick, winding on rules with long guide-arm attachments, three-decked cages and chairs at each station, so arranged as to hold the load while the operation of caging full and unloading returned empty wagons was taking place. The hoisting was most rapid, and when three landing platforms were constructed at the pit-head the winding, loading and unloading was as near automatic as possible. One, the largest winding engine at the Union shafts of the Bonanza mines, had a speed of 75 feet per revolution, and was capable of winding between 4000 and 5000 feet per minute. If he remembered correctly, this engine was built by the Risdon Iron Works of San Francisco, and reconstructed and erected under the supervision of the late W. H. Patton. The first upright drum indi-

cator, with spiral markers, was also attached to this hoisting plant, it being found more accurate and reliable than the old system (i. e., for dry mining). The rapidity acquired by the system of direct hoisting with the double rules and flat wire ropes, on the counter-balance system, was, at that period, proof sufficient, in the judgment of the most experienced engineers, to warrant the assertion that direct winding in actual practice proved to be far more economical than two-stage winding, and, moreover, could be safely accomplished from any depth, and with well-constructed shafts with sufficient compartment accommodation, backed up by compressed air ventilation, no difficulty need be apprehended—as the saying used to be—until the mile post was passed. The question of ropes seemed to him a most simple one; any one of our first-class manufacturers would be found quite capable of producing winding cables of any desired length and strength, the only precaution perhaps necessary would be for the larger companies to send a man who would eventually be required to keep the ropes in order at the mine to the rope factory, to see that the material contracted for was actually woven into the ropes. This was the plan of J. Mackay during the period of rapid hoisting from the deep levels of the Bonanza mines.

(TO BE CONTINUED.)

Knowledge Needed in Mill Work.

TO THE EDITOR:—Some mill men seem to be doing nothing to determine what, if any, changes are required. More of them are working by rule of thumb. Absolute scientific knowledge of what men are doing in milling is not so common as it ought to be. For instance, a man talks about slimes, and I ask, "What is your definition of slimes?" He answers, "Finely pulverized ore." They can give no other definition. The fact is, the question touches a fundamental principle in ore milling. It relates to the size of crushed ore that will pass through an 80 or 100-mesh sieve, or the material which does not settle in some stipulated time, when at rest, or it may be considered the difference between mill tailings and tonnage. One of the steps to be taken is to get an average of tailings, and, after sizing them, determine the values in each size. One test in this way is not conclusive; several tests should be made to determine the truth. These investigations should extend to the pulp when it goes upon the concentration tables used as well as when it leaves them. In this way the degree of fineness of crushing to be sought can be obtained. It is one of the first steps, or A, B, C movements in determining where the losses are, and how to reduce them, if possible. Upon it depends the height of discharge, height of drop, size of screen and weight of stamp required to give the best results. But this is only one of the many scientific—and scientific means common-sense accuracy—steps to be taken when one seeks improvement.

How many who run stamp mills never do any accurate sampling or assaying to actually determine what they are saving or losing? How many of these know the causes of loss? There are plenty of mill men who never disturb tappets, even when the shoes and dies are badly worn, and the drop increases, while, of course, the discharge becomes higher day by day. They never stop to think that, when the size which gives the best result is known, the object should be to get the ore through the screen as soon as it is reduced to that size, and to accomplish that the screen should be where it receives the greatest splash, or in case very fine material gives the best result, the screen should be where it receives, perhaps, the least splash. It is attention to these little things in nearly all occupations in this life which makes the difference between profit and loss. Because, a quarter of a century ago, some mill man stated that he had determined the best way to run a mill, is not a good reason for accepting his doctrine, any more than custom should cause a man to always follow the old foggy notions of his fathers. Wisdom was not born with, nor will it die with, the mill men of twenty-five years ago.

Pony, Montana, June 24.

Chlorine and Gold.

Written for the MINING AND SCIENTIFIC PRESS.

Nascent chlorine dissolves tin. This action is not confined to that metal. Gold and silver are no exceptions. Into a medium size evaporating dish pour 10 ounces of a 20% solution of chloride of sodium and heat to 160° F., adding 20 grains sodium nitrate. Place in the heated solution 2½ ounces sulphide gold ore powdered to 80 mesh. Slightly stir, so as to thoroughly mix; add one tablespoonful sulphur dichloride (S₂Cl₂). Sulphur dioxide, hydrochloric acid and chlorine gases will be evolved. Gently stir, and when quiescent (which will be in about ten minutes) add another like quantity of the reagent (S₂Cl₂). In fifteen minutes a small sample may be taken out and filtered for testing.

This will give a fair idea of what nascent chlorine can do, and the experiment can be tried on any sulphide ore if only finely pulverized.

After separating the metals from the salt solution it can be again used for dissolving, being still salt water and not sodic sulphate.

California Mining Industry.*

The present condition of the mining industry in California is satisfactory. At no time within the past thirty years has the aggregate annual production been so large. The output is showing a steady and marked increase in value. This is not to be attributed so much to the larger output of the older and well known mines, but rather to new enterprises brought to a productive stage.

The most notable feature in this connection is the attention being given to various mineral substances which, in the earlier days, were almost entirely neglected. For many years gold alone was sought for, and although other substances were known to exist, and found, yet little or nothing was done with them. Gold, quicksilver, silver and coal were mined to the exclusion of other substances which in these later years are worked to a profit, each adding its quota to the aggregate output.

The gold product of the State has for the past few years averaged about \$16,000,000. The State has had a succession of dry seasons, when there was considerably less water in the streams than usual, or this amount would have been larger. In a normal season, with the usual rainfall, the gold product should be about \$17,000,000 annually.

In silver the yearly yield is about \$1,500,000 in coin value of the metal. Few, if any, purely silver mines are being worked, most of it coming from operations in lead and copper ores, and some proportion being found with the gold in quartz mining work.

In the year 1900, the last of which we have complete statistics, of the sum of \$17,373,099 (total gold and silver), \$14,058,187 was from quartz mines, \$1,367,016 from hydraulic mines, \$1,018,246 from drift mines and \$930,250 from surface placer operations, including diggings worked by rocker, sluice, tom, river bed mines, dredgers, etc.

From copper mining operations, included in the totals of quartz, \$382,264 gold, and \$645,219 silver; and from lead ores \$67,660 gold and \$70,738 silver were obtained in 1900. For 1901 the amounts derived from copper ores were materially increased, especially in Shasta county, where there are now copper smelting plants.

There are five counties in the State which produce \$1,000,000 worth of gold and silver annually: Nevada, \$1,878,877; Calaveras, \$1,729,888; Tuolumne, \$1,659,250; Amador, \$1,388,703, and Shasta, \$1,369,107.

There are thirty-two counties in California producing gold, of which twenty-six yield some silver also.

There has been for the past eight years a regular increase each year of about \$2,000,000, and in the last year quoted even more. For 1901 it is expected that the official figures when completed will show some \$3,000,000 or \$4,000,000 increase over the previous years.

Within the past decade there has been a very marked change in the systems of quartz mining throughout this State. The speculative feature has been almost entirely eliminated and the work is conducted on a legitimate basis. None of the California gold mines are dealt in or quoted in the stock exchanges. They are mainly conducted as private enterprises, although the majority are owned and carried on by incorporated companies. Failures are much less frequent, and knowledge and experience have done much toward giving a reliability to quartz mining it did not possess in earlier years, when there was a general inexperience as to the characteristics of veins, and a lack of knowledge and economy in working the ores. It is possible now to work ores profitably which at twice the value twenty years ago were worthless. High priced or useless officials are no longer employed, and only skilled men engaged in the different departments. Railroads, better roads, cheaper supplies, improved means of transportation, better machinery at less cost, greatly improved reduction methods and appliances, water and electric power, oil fuel, canvas plants and cyanide process, and generally improved systems and appliances have all contributed to better the conditions and bring forth more profit.

As a proof that it is the new and changed conditions, rather than the mines themselves, which has made quartz mining so much better from a business point of view, may be cited the fact that so large a number of old abandoned mines have been rehabilitated and become producers within the past ten years or so. It used to be thought that a gold mine once found or purchased should not only pay practically for its own development, but for its own plant as well. In time, however, experience proved that the most successful properties were those which were properly opened with sufficient capital to develop and equip them. In large mines deep vertical three-compartment shafts have taken the place of inclines following the vein down, and ore is extracted through drifts running from shaft to vein. This is found to be the most economical and permanent method where the veins are of any size and the depth great. More-

over, in the case of the old abandoned mines, when reopened, the companies sink shafts 1200 or 1500 feet deep direct, without stopping to drift until the desired depth is obtained. This deep sinking involves large preliminary expenditure, so that only well-capitalized companies are able to undertake and continue the work.

Within the past ten years twenty-three of the once abandoned Mother Lode mines in El Dorado, Amador, Calaveras and Tuolumne counties have yielded since being reopened upwards of \$26,000,000; some of these referred to were worked for the full period named and others only three or four years.

The gold mines still yield the larger proportion of the total valuation of the mineral output each year. Out of a total of \$32,622,945 in 1900, the precious metals yielded \$17,373,699, or a little over one-half, and this notwithstanding the claim that copper and oil would each shortly put gold in the background. And while copper and oil are rapidly increasing in annual value, the gold output is also increasing, and it will be many years, if it ever happens, before gold will take a secondary place in the mineral industry of California.

Of this total of \$17,373,699, gold and silver (\$1,510,344 being silver), \$943,072 came from the counties of San Diego, River-side, San Bernardino, Los Angeles, Ventura, Santa Barbara, San Luis Obispo and Orange, the balance coming from northern California mines. Kern county, being the dividing line between the two geographical (and not political) sections, produced \$959,988 in 1900, most of it coming from the mines at Randsburg and Johannesburg.

The order of rank of the mineral substances produced in this State according to annual value is: First, gold (\$15,863,355); second, copper (\$4,748,242); third, petroleum (\$4,152,928); fourth, silver (\$1,510,344); fifth, quicksilver (\$1,182,786); sixth, borax (\$1,013,251). These are all that yield over \$1,000,000 annually.

As showing the growth of copper mining in California, it may be stated that the metal was produced in four counties in 1899, in eight counties in 1900, and in eighteen counties in 1901, as follows: Alpine, Alameda, Amador, Calaveras, Fresno, Inyo, Kern, Mariposa, Madera, Merced, Mono, Nevada, Placer, San Bernardino, Sacramento, Shasta, Stanislaus and Trinity.

Mines are also being developed in other counties. Smelting works are in operation in Shasta, San Bernardino and Contra Costa counties, the latter treating ores from Fresno county. Ore is also treated by the custom smelter near Port Costa. By far the largest production of copper is in Shasta, that county having in 1900 yielded 25,736,473 pounds, out of a total for the entire State of about 29,515,512 pounds. For 1901 Shasta produced about 30,990,781 pounds out of a total of 34,931,985 pounds. This value, with that of gold and silver, brings Shasta county several million dollars ahead of every other county in total valuation of mineral output. In May last another large smelter was started at the DeLamar mines. This product, added to the larger yield of the Mountain Copper Co.'s smelters at Keswick—the largest on this coast—adds very materially to the yield of Shasta county, and still other smelters are shortly to be built.

It is to be noted that the presence of these larger copper smelters has an important bearing on gold and silver mining. Quartz is needed for flux, and thousands of tons of ores are purchased for this purpose. Therefore, miners find a ready market for their ores, and hundreds of quartz mines, formerly idle, are now being worked. Ores of so low a grade that they would not pay to mill alone can thus be utilized. The miners can work these claims and be at no expense for reduction works, selling their ores at a price based on the gold and silver contents by assay.

He Had Not Resigned.

The Cornish Telegraph of recent date tells the following story: A correspondent of ours in the United States sends the following story, which he says is told by the miners at one of the Portage Lake mines, illustrating the frankness, honesty and force of character of one of the Cornish mining captains: A new superintendent having been appointed to a mine whose lease of life was considered nearly run out, in order to curtail expenses or make room for a man he had in view later on, went to one of the mine captains while he was at work underground, and quietly told him that his resignation would be accepted, or, in other words, the company intended to dispense with his services. "You can say," said the superintendent, "that you have resigned." "All right, cap'n," was the reply. When the shift was ended the discharged captain went straight to the changing house, which was filled with miners. He addressed them as follows: "Ere, boys, when you read that morning paper you'll read as 'ow I resigned my position, 'aving in view a job with more honor and higher salary. That there story'll be a lie, for boys, I'm sacked. I did not want to leave. I was satisfied to stay with you, for I was putting in all my brains for this 'ere company, and not spending my time looking for a better job. The long and short of it, boys, his, I'm fired. I guess there may be room for me somewhere. No 'ard feeling, boys."

American Copper Mine.

Written for the MINING AND SCIENTIFIC PRESS.

The table herewith will show the expense of opening a small shaft in the Middle States, which may prove interesting as a matter of comparison with expenses in other districts. This table covers 540 shifts, ending December 31, 1901. We did not run a night crew all the time and shut down for all legal holidays, with the usual result.

		Per Ft., Shaft.	Per Ft., Drift.
1—Management.....	\$ 1,800.00	\$ 1.481	\$ 0.938
2—Drilling and blasting.....	2,865.47	2.36	1.49
3—Mucking.....	3,152.01	2.594	1.641
4—Other mine labor.....	3,886.18	3.198	2.024
5—Hoisting.....	1,120.70	.922	.583
6—Compressed air.....	4,216.90	3.47	2.20
7—Explosives, etc.....	1,475.00	1.20	.80
8—Mine lighting.....	265.48	.218	.14
9—Mine supplies.....	416.51	.342	.217
10—Repairs.....	304.90	.25	.16
11—Pumps and fittings.....	175.80	.217	....
12—Shaft fittings.....	540.53	.667	....
13—Oils.....	81.22	.067	.042
14—Lumber.....	203.16	.25	....
15—New equipment.....	130.00	.16	....
16—Surveying.....	115.00	.08	.08
17—Assaying.....	300.00	.247	.156
Totals.....	\$21,048.86	\$17.723	\$10.391

Ore consists of native copper inclusions in a hard metamorphic rock lying as a contact sheet, with trap hanging wall and hard sandstone foot wall. Under the sandstone lies hard shale. Dip of the formation averages 11°. The ore bed is 2 feet in thickness, and as copper runs up into the trap about 8 inches of the latter is also broken. To make headroom, the sandstone and shales are taken to 3 feet thickness or more, as the layers thicken, so that the shaft averages about 6 feet in height and something more than 10 feet in width. Our practice has been to shoot out the sandstone and shale beneath the ore, with cut as usual. As this takes only 3 to 3½ feet, it diminishes the effectiveness of the powder, but the practice was generally followed to secure separation of the ore from the waste. As the work is being done for development, and to ascertain the exact value of the bed, it was thought wise to incur this extra expense, as well as some further expense on the dump in piling the ore for special mill runs. The result was satisfactory, as we succeeded in getting exact values for all the ground penetrated.

The work done during the year was as follows:

	Feet.
Reiff or main shaft.....	655
Spencer shaft.....	165
Drifting at Reiff shaft.....	640

Maximum depth of shaft, 1110 feet m dlp. Total drift work at Reiff shaft amounts to 1800 feet. No work of importance other than repair work was done on any of the other shafts during the year.

In the table Nos. 1 and 17 include only amounts apportioned to the mine, the cost being divided proportionally between the mine and mill. No. 4 includes the expense of preparing runs for the mill and some small labor items, which by rights should be charged to the mill, but owing to the difficulty of determining this with exactness it has been allowed to stand charged to mine expense. No. 6 includes coal, engineers, firemen and necessary oils, etc., for the air plant. Pumping was done by air. About 8,000,000 gallons of water was handled from the shafts. This also includes the pumping of 15,000 gallons of water daily for use on mill tables. This water is pumped from two wells by air lift. A corresponding deduction should be made for this.

No. 8 includes, besides the regular lights, experiments on every known system of lighting except the electric light, and this amount does not include a few dollars spent at local tin shops for devices of one kind and another.

No. 10 I thought rather high, but included repairs made on a number of machines which had been carried along out of repair from previous years.

No. 11 includes a small beading pump every three months or so, and when everything worked rightly the men kept perfectly dry.

No. 12 includes main air pipe, discharge pipes for pumps, ties, 20-pound rails, signal wires, etc.

As will be noticed by No. 14, we are saved the great expense of timbering, all this lumber being used at the mouth of the new shaft or about the surface buildings. Below we use not a stick, and have openings 40 to 60 feet across. My idea has been to work out the ore and replace by waste made.

During the latter half of the year the work was done by contract with the men, the basis being the number of feet advanced in the shaft. I believe it was a saving to us and the men made more per day, but this is another story. Drillers' wages were \$2.50 and muckers made \$1.50. For unskilled labor we had to depend on Italian immigrants, but they are plentiful and willing.

This mine is 35 miles from New York City, 3 miles north of Somerville, N. J., in the Newark system, corresponding to part of Triassic time.

The drift work referred to in the table averaged 6 feet by 12 feet.

Somerville, N. J., June 24.

* Condensed from article by Chas. G. Yale, in annual edition Sacramento Bee, July 1.

Mining and Metallurgical Patents.

Patents Issued June 24, 1902.

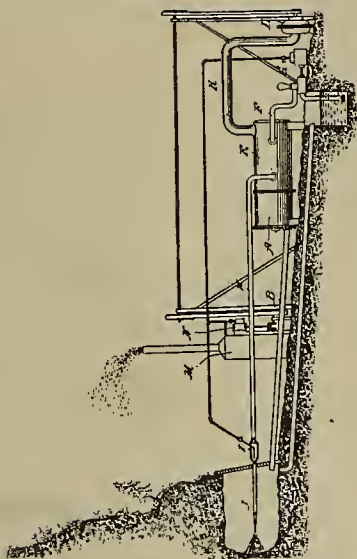
Specially Prepared for the MINING AND SCIENTIFIC PRESS.

CONVEYOR.—No. 702,905; A. M. Acklin, Pittsburg, Pa., assignor to Heyl & Patterson.



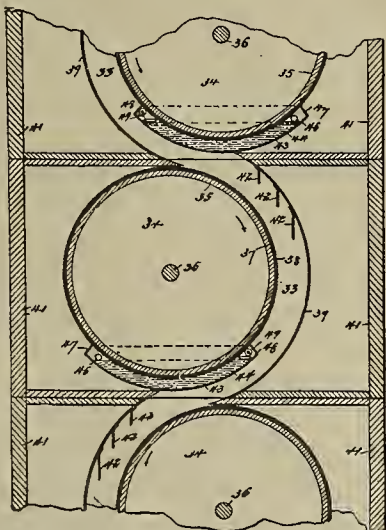
In conveyors, combination with suitable receptacle, of track arranged parallel therewith, series of trucks on track, each comprising body portion having bearings at each end thereof and an axle journaled in bearings with wheels rigidly secured thereto, reciprocating bar secured to truck, and series of swinging flights carried by bar.

APPARATUS FOR THAWING FROZEN GROUND.—No. 702,924; G. R. Clarke, Dawson, Canada.



Apparatus for thawing frozen ground, comprising furnace, water compartment into which pass products of combustion from furnace, exhauster for water compartment, for removing products of combustion from water compartment after passage through water, means for drawing water from water compartment and discharging it upon frozen ground in drift, pipe leading from drift to furnace, for supplying latter with heated air, and means for supplying water compartment with water, point of supply of water to compartment and point of drawing off water from compartment being above connection between furnace and water compartment.

ORE SEPARATOR.—No. 702,990; F. C. O'Brien, Chicago, Ill.



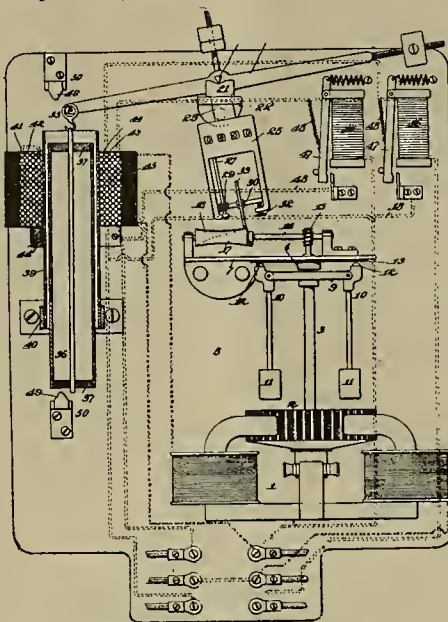
In separator of class described, combination with ore-conduit, means for passing ore therethrough, of an amalgamating cylinder rotatably mounted in conduit provided with peripheral surface of copper, removable covering of copper wire gauze or netting contacting surface of cylinder, means for continuously supplying a coating of mercury to cylinder.

ART OF TREATING ORES CONTAINING SILICA OR SILICATES.—No. 702,943; G. Guiraud, Cripple Creek, Colo.

Roasting, with free access of air and agitation,

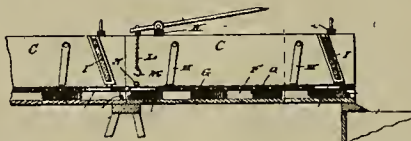
charge containing ore, silicon in oxygen combination, and haloid salt of alkaline earth metal, quantities being substantially those quantitatively requisite to form stable silicate of the alkaline or alkaline earth metal, and haloid of precious metal, continuing heating ore until haloid of metal to be recovered is volatilized, carrying off, collecting separate from fumes of combustion, precious metal values as haloids or oxyhaloids.

ELECTRIC METER.—No. 703,051; T. A. Edison, Llewellyn Park, N. J.



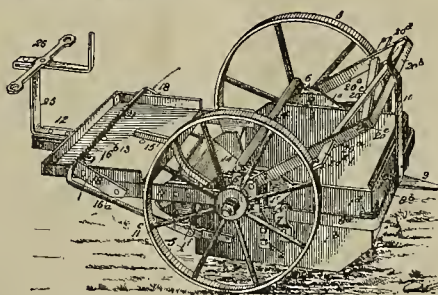
In an electric meter, combination with overbalanced beam, a core connected to one end of beam, stationary coil surrounding core and traversed by current to be measured, register connected to and movable with beam, and friction wheel movable with beam connected register, cam with which friction wheel periodically co-operates, electric motor connected across line for rotating cam at constant speed, an auxiliary coil of high resistance surrounding core for overcoming magnetic inertia without producing saturation or polarization thereof, core being in series with motor.

ORE SEPARATOR.—No. 703,084; C. C. Pratt, Portland, Ore.



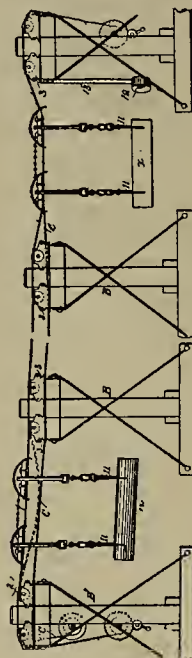
Apparatus for separating metals from ore, gravel, loam, combination of conduit, sluice arranged to receive from conduit having grizzly disposed below same, having riffle sections arranged end to end on bottom susceptible of being raised; riffle sections respectively comprising board having openings, longitudinal zigzag walls connected to under side board forming tortuous channels, one or more transverse strips connected to and depending from board, screen connected to upper side of board, one or more transversely disposed inclined boards arranged in sluice disposed slight distance above riffle, adjustable devices adapted in one position to retain riffle sections in their operative position on bottom of sluice, in another position to permit riffle sections being raised, suitable means on sluice for raising riffle sections.

WHEELED SCRAPER.—No. 703,352; T. D. Radcliffe, Lawrence, Kansas.



Combination with arched wheel carrying axle, pan pivotally suspended from axle, automatically operating locking means carried on pan for engaging axle to hold pan to upright position, pan frame, platform mounted on frame having stud members 18, draft frame 16, wheel engaging frame 20, including transversely disposed crossed members, having movement in their longitudinal direction, ends terminating in wheel engaging grips 20^d 20^e.

ELEVATED CABLE SYSTEM OF TRANSPORTATION.—No. 703,222; T. Alexander, Bismarck, Miss.



Overhead cable system of transportation, combination with series of stationary frames or supports of cable, series of grooved sheaves held on supports around which cable is wound, dogs pivoted on opposite sides of sheaves adapted to engage with cable section encircling sheaves, crossing on upper side of latter, two windlasses applied to cable supporting frame which is intermediate terminals of line, means for locking windlasses, sheave 14 arranged adjacent to one of cable supporting sheaves 2, anti-friction sheaves arranged on frame below each 2, cable passing over several sheaves beneath supporting sheaves 2, secured to windlasses, looped between latter.

DRY ORE CONCENTRATOR.—No. 703,356; R. E. Waugh and E. Waugh, Denver, Colo.



In dry ore concentrator, combination with air chamber, of endless apron arranged to close at top, comprising body part of fibrous or other material adapted to allow air to pass therethrough under pressure, rubber strips attached to edges of apron, each having two flanges extending approximately at right angles to each other, one of which flanges projects above concentrating surface of apron and maintains ore thereon, other flange secured to edge of apron, rods or reinforcing pieces extending transversely across apron on inner surface, their extremities being attached to outer edges of apron, straps composed of leather attached to edges of apron on its inner surfaces.

Deep Borings in the United States.

The deep well borings of the United States, made for water, oil and gas, are the subject of a statistical report by N. H. Darton in the series of water supply and irrigation papers of the United States Geological Survey. The list of deep wells is arranged by States, in alphabetical order, and appears in two pamphlets known as Water Supply Papers Nos. 57 and 61. All wells 400 feet or over in depth are carefully listed. Depth, diameter, yield per minute, and other characteristic data are given, and many instructive details are noted indicating for what purpose the borings were originally made, the character of the product obtained, and whether the wells are in use or abandoned. For the benefit of persons desiring more detailed information concerning wells in any particular region, references are given to the literature or other sources from which the data were obtained. The large product of natural gas in the East and the West, the enormous output from the oil fields in California, Texas and the East, and the considerable and indispensable water supply furnished by the deep wells on the plains and in the arid and humid States, make concise and accessible information of this nature valuable for economic and scientific purposes.

NEARLY every great improvement to which the world owes its present prosperity has fought its way against clamor, knavery and contempt. But anything and everything has ultimate success in exact proportion to its merit.

Mining Summary.

Specially compiled and reported for the
MINING AND SCIENTIFIC PRESS.

ALABAMA.

Birmingham states: "According to the report of President Flynn of the United Mine Workers, about 11,000 miners in the Birmingham district have obeyed the strike order which went into effect July 1."

ALASKA.

(Special Correspondence).—The season's output of gold, according to conservative estimates, will be \$1,000,000. The principal pay came from the Snowflake fraction, which produced \$50,000; the Sugar, Molasses and Daisy claims, all on the divide between Anvil, Dexter and Nekla gulches, producing \$125,000, for the winter season. Forty thousand dollars was taken out of a bench claim below Specimen gulch on Anvil creek, owned by Dr. Southward, former Deputy Recorder of the Nome district. Smaller amounts have been produced from benches on Bourbon, Dry, Cooper, Saturday and Newton gulches. In a few instances shafts to the depths of 100 feet were sunk and pay found on bedrock. Solomon river benches have also proven to be productive. In bench off No. 8 below, nuggets to the value of \$30 and \$40 have been found. Ophir creek has also contributed largely to the output of gold.

The season is nearly four weeks earlier than last year, the snow is nearly all disappeared, and the conditions in general are quite satisfactory for a good summer season. Judge Wickersham has cleared the calendar of all old litigations, and it is to be hoped that Judge Moore will continue the good work inaugurated by Judge Wickersham.

Chas. D. Lane's pumping plant is nearly completed, at an expense of nearly \$500,000, and will be in operation in a short time, conveying water from the Snake river to his Anvil creek mines.

Candle creek has so far only speculative value, no additional information having been obtained than that of last fall. There will be, however, quite a rush into that section this summer.

There is enough labor here for any purpose this season. Wages will not be any higher than last summer, viz., \$5 and board for a day of ten working hours.

Nome, Alaska, June 15.

W. A. Boyce had a narrow escape from drowning May 23, at Nome. He had been prospecting the sea bottom close along the shore line near the Wild Goose section, and failing to get results with a sand pump, conceived and built a diving bell along lines of his own. The machine is 6½ feet high and 3½ in diameter, made of iron, and weighted with 2000 pounds of rock is lowered into the sea. Inside a man, supplied with air from a pump above, can work comfortably. While Boyce was being lowered into the water the device broke, but after one-half hour's work he was rescued.

Between Nome and Nome river there are 300 men at work on the beach with rockers and sluice boxes. Of the latter there were thirty strings. As to the results obtained by the miners little is known, they are not saying much as to what they find in the ruby sands.

J. T. Lindseth, mail contractor between Teller and Kotzebue, states that he saw \$50 offered for a sack of flour at Candle, but that price was refused. There are plenty of beans, bacon and cornmeal in the camp, however. He left Candle May 3, followed the Fish river route as far as he could, and when traveling by the river became impossible, with his three reindeer, he crossed the mountain direct to Council. From the latter place he again travelled across the country to Nome. He met scores of mushers, many of whom were packing food on their dogs' backs, having abandoned their sleds.

P. S. Early of the Bessie G. M. Co., Douglas island, will buy a motor and machinery, Yankee Cove showing up satisfactorily. A tramway will be built from the mine to the mill this summer and ten stamps added.

ARIZONA.

COCHISE COUNTY.

Last week at the Copper Queen Con. M. Co. a \$12,000 fire destroyed the miners' change room and contents, rope houses and contents, about 200 feet of car track and several hundred feet of mine timbers. Miners on shift in the Czar shaft had their street clothes in the change house, and those off duty had their working clothes there. The loss to the miners is estimated at \$3000.

The new bank at Douglas is in operation, L. C. Hanks cashier.

GILA COUNTY.

A special topographic map of the Globe

mining district, this county, has just been issued by the U. S. Geological Survey. The map is drawn on a scale of somewhat less than 5½ inches to the mile, and shows in great detail the features of the topography and the locations of the mining interests of the region. All the trails and roads are clearly shown, as are also the mines, smelters and numerous prospects scattered over the region. The map is now available at 5 cents a copy by addressing U. S. Geological Survey, Washington, D. C.

MARICOPA COUNTY.

The White Gold M. Co., on the Agua Fria, above Wickenburg, has a tunnel in 135 feet, with ore showing free gold.

MOHAVE COUNTY.

At the McCrackin mine, near Signal, men are sampling and measuring the ore body, pending a projected sale of the property.

C. E. Lundborg is in Kingman buying supplies and teams for the Salt Springs M. Co., Gold Basin mining district.

Teams and supplies have also been sent to the El Dorado mine, Gold basin.

The Lucky Boy at Chloride is shipping ore.

At the Gom mine, Chloride, sixty animals are carrying ore to the C. O. D. mill, 8 miles distant, over a mountain trail. The packers receive \$4 per ton and make one trip a day. The ore runs \$30 in gold.

YAVAPAI COUNTY.

Eight miles of the road is completed from Mayer to the Crown King mines. Total length of extension, 25 miles. The last 6 miles of the road will require the most work and time, as heavy grading and a great deal of tunnelling will be done. The road opens a good mining country, and is stimulating owners to action.

Prescott reports that the Iowa M. & D. Co. has the Conger mine, and expect to open the old workings and make a mine of it. The Monarch G. & C. M. Co., adjoining the Conger on the north, is sinking a two-compartment shaft 500 feet. The Lion Co., operating near by, has a new 7x10 hoist. The Coronado G. & C. M. Co. may spend \$100,000 on its mines on the western slope. It is backed by Prescott men.

The Wheel of Fortune group, some 3 miles south of Prescott, has been secured by Hartford, Conn., men, who expect to have a stamp mill on the property.

Supt. Symington, Grand View M. & M. Co., Cherry creek, will sink shaft 500 feet deeper.

Supt. M. Bradley of the Lion G. M. Co. is operating Bardshar mine, Cherry creek. C. Timmons of Prescott is Supt. Copper Prince M. Co., Hillside. The ledge is 20 feet wide; the ore carries 10% copper, \$6 gold and silver to the ton.

The Iowa G. M. & D. Co., L. M. Wambacher manager, has bought two groups of claims in Cherry Creek district, near Prescott, and will develop them.

CALIFORNIA.

AMADOR COUNTY.

W. A. Nevills and J. P. Johns have sued W. Fleming, D. C. Nichols, C. W. Cowles and J. D. Bost for \$150,000, on an alleged agreement of plaintiffs to buy one-half the capital stock of the Amador T. & M. Co. and Hamilton G. M. Co. for \$250,000.

Near Sutter Creek, the Mitchell mine has resumed operations.—The Amador-Phoenix is running levels at the 100-foot station.—At the McKenzie mines, Nos. 1 and 2, the tunnel is in 200 feet on the vein, the ore assaying \$8 to \$12 in free gold and sulphurets assaying \$55 per ton.—Ore 5 feet wide is reported in the Edinburgh shaft that gives milling tests of \$82.

Supt. Parks of the Kennedy, at Jackson, now has the deepest mine shaft in the State—2550 feet—but now proposes to go deeper, and has ordered a new hoisting plant with sufficient capacity to sink 4000 feet. He will also have new steel headgear.

The ledge has been reached on the 850-foot level in the Fremont shaft, near Drytown. Some of the ore assays \$150 to the ton.

The Dispatch says a new steel gallews frame and hoist is in contemplation at the Gwin mine.

In the drift from the east shaft of the Kennedy mine, on the 2450-foot level, the ledge has been found, said to be a repetition of the ledge at the 2550-foot level.

W. Stirnman & Bro. have commenced a crosscut tunnel to strike a shoot of ore 100 feet below the present workings.

A 10-stamp mill for the Defender mine goes in next month.

L. C. Hyner has charge of the Mitchell mill and mine, near Jackson.

BUTTE COUNTY.

Near Oroville, J. I. Booge, who had \$3500 to pay for the Garden City, has returned to Los Angeles, the investment having been deferred.

Oroville reports that what is locally sur-

mised to be the first stop toward the building of a railroad up a branch of the Feather river, connecting with the overland at Reno or Boca, was the filing in the Butte county recorder's office on the 1st of eighty-four placer mining locations, all signed by the same persons and embracing a tract lying along the north fork of the Feather river.

A. J. Waterhouse is adding twenty-five stamps to the Golden Trout mill, and by Sept. 1 thirty-five stamps will be crushing ore.

CALAVERAS COUNTY.

Near West Point, the Yellow Aster mine is sending ore to the Nixon mill.

Work has begun on the Lloyd mine at Central Bill. A 250-foot double compartment shaft will be sunk to the gravel, under charge of J. Jackson.

The Last Chance mine, Angel's Camp, is to be developed.

EL DORADO COUNTY.

R. Smith, near Omo, is getting out ore, ready to crush as soon as water can be had.

The Gold Bug mine, Georgetown, has resumed after a temporary close-down.

McKenney & Grube are developing the Stuckslager mine, near Lotus.

Work at the Horseshoe Flat mine, Newtown district, has been suspended for the present.

The Placerville Democrat says: "F. E. Huber has thrown up his contract to extend the big tunnel to the River Hill works. The contract price was all right, but the ground was too hard for the contract price."

KERN COUNTY.

At Randsburg the Miner says there are 175 men on the payroll of the Yellow Aster mine, including the pumping stations.

Messrs. Bethune & Holt made a recent trip with a train of burros through Death valley direct from Tonopah, fourteen days. Traveling in the day was out of the question. Following is their itinerary, which is a matter of some interest: Leaving Tonopah they took the trail for Stonewall mountain 45 miles, then to Chadwick mills 30 miles, then south 64 miles to the north end of Death valley, 5 miles to Mesquite springs, 8 miles to Stovepipe springs, 20 miles to Death Valley ranch, near Coleman's Borax Works. These works shut down in April for the summer, and will start up when the weather becomes bearable. From this point they crossed the valley to the west and took the trail to Blackwater, 16 miles, thence 14 miles to Wild Rose springs, 10 miles to Warm springs, 7 miles to Ballarat, thence to Randsburg.

The Jewett & Blodgett refinery is turning out hard asphalt.

LOS ANGELES COUNTY.

The Red Rover mine at Acton is again in operation.

The Standard Oil Co. will build a 6-inch pipe line from the Fullerton oil fields to San Pedro, 35 miles, and a branch to be run to Whittier.

NEVADA COUNTY.

W. F. Snyder, manager Western Exploration Co., says he has the Red Cross group of gold-bearing mines. A plant will be erected next season.

H. Thomas will superintend operations at McAvoy & Co.'s Standard mine, near the Jenny Lind, Grass Valley.

The Providence M. Co., the Providence G. M. Co. and the Providence G. & S. M. Co. have filed incorporation papers. These companies were incorporated in San Francisco in 1863: capital stock, \$124,000.

Grass Valley papers say there is not an idle miner at Washington or Maybert.—The Grey Eagle has started up. A 10-stamp mill is being graded for.—The Red Cross has resumed operations.

The business part of Washington was destroyed by fire on the 30th ult.

PLACER COUNTY.

The 20-stamp mill at the St. Patrick mine, near Washington, has been taken to Black canyon, near Forest Hill, where it will be erected on the property of the Black Canyon quartz mine. A ditch and flume will be built to bring water from Secret canyon to run the mill.

In the Hidden Treasure drift mine, Centerville, the tunnels at Sunny South and Centerville are operated on a large scale; 180 men are employed. The face of the tunnel at Centerville is in 10,100 feet; breasting operations are carried on at 8000 feet. During May 10,633 tons of pay gravel and 806 tons of waste were extracted—a daily average of 440 tons. The company are working six treasts. The electric plant, cost \$20,000, is a success; capacity, 200 H. P., generated by dropping water from a ditch with a flow of 90 cubic feet per minute, delivered to a water wheel under a vertical head of 850 feet.

Supt. H. M. Jarvis has twenty-five men employed at the Bob Lewis gravel mine, at Red Point, on the same channel as the

Red Point Co. The tunnel is 1300 feet in length; gravel is reached by an upraise into the channel; fifty tons of gravel are daily taken out.

PLUMAS COUNTY.

C. R. Thompson is running his quartz mill near Rich Gulch on good ore.

SAN BERNARDINO COUNTY.

The Los Angeles Mining Review states that the new eighty-ton smelter at Oro Grande has been blown in. J. Bailey is manager. The smelter was built by the Llewellyn Iron Works.

SAN DIEGO COUNTY.

Receiver C. W. Pauly of the Golden Cross mine has filed his fourteenth monthly report in the Superior Court at San Diego. It covers May, and shows receipts of \$13,487.42, of which \$11,693.37 was bullion from the cyanide plant. The disbursements amounted to \$8322.31 for labor and supplies.

SAN MATEO COUNTY.

Halfmoon Bay reports that a Guiberson, Sallee & Hayne well, Purissima canyon, is flowing at a rate of 1000 barrels a day 54° oil from a depth of 800 feet.

SANTA BARBARA COUNTY.

Piping the entire product of the Western Union Oil Co. in the Careaga field, near Los Alamos, to the Alcatraz refinery, on the coast near Gaviota, is projected; about 2000 barrels per day. Since the collapse of the trust the Crockers of San Francisco have resumed control of the Alcatraz properties, including the refinery, the pipe line to Sisquoc and the mines at the latter point. Instead of mining asphalt, part of the pipe line will be taken up and relaid to connect with the Western Union Co.'s pipe line, now extending to the narrow gauge railway at Blake station.

SHASTA COUNTY.

The Oregon & Montreal G. M. Co., operating the Ashland mine, has new power plant, hoist, air compressor and machine drills. Sinking in the main shaft will be continued and stoping will be carried on on the 775-foot and the 875-foot levels. With this new plant the company can go down 2000 feet.

Supt. E. V. D. Johnson says bids will be opened in San Francisco on the 10th for the electric plant, to be built by the Northern California Power Co., near Whitmore, capacity 4000 H. P. The electricity will be generated by water power from a 4000 foot pipe line from South Cow creek.

Supt. Johnson says the transmission line will be run to the mines and smelter of the Bully Hill C. M. & S. Co., and other mines of the section and the towns of De Lamar, Sallee and Copper City. From Bully Hill the line will be run southward to Palo Cedro, where it will connect with the main transmission line now in use.

Manager Snider and Supt. Adams have been inspecting the Balaklava Copper property, which has considerable ore blocked out. P. Kimberly, president of the corporation, which has a bond on the property, will visit the mine next week, after which the proposition to build a smelter will be discussed.

T. G. Parker says that an electric railway will be built between Redding and Keswick.

W. Moran, manager Oro Fino M. Co., near Shasta, says he will put in a stamp mill and, later, a cyanide plant.

The Iron Mountain mine is paying muckers \$2.50 per day.

SIERRA COUNTY.

It is reported that the blue gravel channel is found in the Swansea mine.

In the Hilda mine, near Downieville, lying idle for years, leased by Mackey & Davine, a strip of ground 80x30 feet gave \$2000, mostly in coarse gold.

The ledge is reported struck in the lower tunnel of the Plumhago mine. It will require work to determine its extent and value.

SISKIYOU COUNTY.

Supt. E. D. Baker, Cherry Hill quartz mine, Cherry creek, has a ledge of free milling ore at a distance of 1500 feet from the mouth of the tunnel.

Green & Harrison, porphyrydike mine at Deadwood, have five ounces of gold from a week's work.

A. C. Brokaw is running his quartz mill at Hull gulch, and operating his hydraulic claim with giants and elevators.

STANISLAUS COUNTY.

The Stanislaus W. & P. Co., it is announced, will begin operations shortly with 500 men, if they can be had. They will pay \$2.50 per day.

TRINITY COUNTY.

F. P. Burris is Supt. Valencia C. M. Co., east fork of New river.

Supt. W. P. Gester is moving the Bullychoop M. Co.'s 10 stamp mill to the South Fork of Indian creek; ten additional stamps will be added. The new equipment includes 3000 feet of tramway from

Supt. J. Porter of the Fairview mine, Minersville, has machinery for a new 10-stamp quartz mill on the road. Fifty-five men are employed—twenty-five at the mine and thirty on outside work. The present working level to the new mill-site.

TUOLUMNE COUNTY.

J. H. Darrow has bonded to C. Hampton for \$8000, payable before Dec. 31, 1905, the Darrow mine, at Rawhide. The Mohican M. Co., through Supt. F. Chappellet, Jr., will petition the county for a new bridge over the Tuolumne river, near the mine.

At Stent the fire in the Jumper mine caused only temporary cessation of work, resuming to-day. Forty stamps are running on ore from the Jumper & Golden Rule.

Supt. Moore is preparing to operate the Green mine, near Sugar Pine.

At the Shawmut mine forty stamps are being added to the mill; sixty stamps have been dropping for some time, besides the original forty. There are over 200 men on the payroll.

Near Columbia, the break in the flume of the Star mine is being repaired.

YUBA COUNTY.

The Eagle Canyon G. M. Co. has let a contract to H. P. Barker to put in the necessary flumes at the claim in the channel of Yuba river, south of Dobbins Ranch.

COLORADO.

St. Louis asserts that \$1,000,000 worth of gold bars, just as they come from the smelter, will form the apex of the pyramid of the Colorado mineral products to form the central figure of the exhibit from the State in the mines and metallurgy building at the World's Fair in 1904. The interest on \$1,000,000 for six months at 5% would amount to \$12,500.

BOULDER COUNTY.

Manager Lake of the Boulder County mine, Wall Street, has his mill in operation.

The Boulder-Amazon well is now down about 170 feet and still sinking. The Boulder-Petroleum well is in oil at a depth of 650 feet.

CLEAR CREEK COUNTY.

Near Idaho Springs, Supt. Pickett, International M. Co., is driving first level drifts east and west on the Morgan mine. The Golden Lily mill, Brinkerhoff & Preston, at Alice, is operating twenty stamps.

Manager Roller will rebuild the Shafter shafthouse and put in new machinery.

G. W. Crawford has an option on the Benton mine, Silver mountain. It has a 600-foot shaft and many hundred feet of drifts. It has been idle fifteen years. There will be a test of 1000 tons of different grades of material; the result will serve as a guide for the erection and equipment of a plant adapted to the treatment of the ore in sight and awaiting development.

Near Georgetown the Courier reports the Kelly tunnel pushing ahead 7 feet per day since the drills were started.

At the Centennial Manager Kennedy is retimbering 300 feet on the 400-foot level.

At Montezuma the Rothchilds Co. under contract to Maxwell & Cleaves has the tunnel in over 1000 feet.

Near Empire is completed the crosscut on the Conqueror group to connect the workings of the Patsey and Conqueror veins. Fifteen men are drifting in both directions on the vein from the new opening for the short cut by the old tunnel level. The final transfer of the Conqueror property to the Milwaukee parties, represented by E. M. Brown as general manager, will soon be made.

Near Empire the Ruby lode has been cut by Ruby tunnel in Douglas mountain. Supt. Burgess has opened at an elevation of 400 feet above the tunnel the same vein; the Johnson tunnel, owned by the same company, will cut it 350 feet deeper.

Manager G. Sinclair of the Nero-Philadelphia M. Co. has acquired control of the Rosecrans property, Silver mountain. The vein shows a width of 20 feet. The new management has opened up 3 feet of low-grade ore to be treated at the Golden smelter.

Near Silver Plumework is resumed on the Stevens mine by E. J. Wilcox, the owner. The tunnel will be pushed through McClelland mountain to intersect different properties in East Argentine owned by him; this means about 4000 feet of tunnel work and will be used as an outlet to the East Argentine mining district. The mine produces lead ore with values in gold and silver.

The Wisconsin is making weekly shipments of fifty tons that average 300 ounces silver per ton.

J. H. Towne will open up the Indiana lode on McClelland mountain.

Idaho Springs reports an electric line projected up Fall river to Yankee. The management of the Burlington Railroad

Co., representing the Alice mine, is reported instrumental in the construction of the line.

CUSTER COUNTY.

At Custer the Bull-Domingo mine, operated by the Neptune M. Co., is in operation.

The mill completed by J. Lacy at Westcliffe has a daily capacity of fifty tons.

The Toledo, adjoining Custer on the east, has been started up after being idle several years.

EL PASO COUNTY.

(Special Correspondence.)—The Telluride Reduction Co., Colorado Springs, under the management of H. W. Fullerton, which has lately started up, find they are unable to handle all the ore they can obtain, and have decided to increase the capacity of the mill from 30 to 500 tons. Building will commence in about three weeks. The ore is treated by the chlorobromination process. They are now treating ore that assays \$7.25 per ton with a profit to the miner as well as to themselves. Mr. Fullerton claims they can handle ore running \$5000 to the ton or higher.

A visit to the Portland mill, Colorado Springs, shows two of their furnaces in operation, and they hope to have the third one running in about thirty days. Everything is working smoothly as far as they have started up. When the mill is running full capacity they can handle 300 tons per day. They expect to handle the ores from the Portland mine exclusively.

J. D. Hawkins, Supt. of the Colorado and Standard plants of the U. S. Red. & Ref. Co., Colorado City, states they are handling 800 tons of Cripple Creek ore every day, and plenty of ore on hand.

Colorado City, June 28.

The United States Smelting Co. say they will build a \$1,000,000 zinc-lead smelter to handle the by-product of zinc-lead derived in smelting gold and silver-copper matte along the lines now carried out by the zinc-lead smelter at Canon City, either there or Pueblo or Colorado City, probably the latter.

FREMONT COUNTY.

The Union plant, Florence, under the management of J. Q. MacDonald, is handling the usual number of tons of ore daily.

The Dorcas M. M. & D. Co. are handling 100 tons per day of the Cripple Creek district ores. The Dorcas is the only cyanide mill running at Florence at present.

One-fourth interest in seven claims belonging to the Florence-St. Elmo M. Co., Buena Vista, Cottonwood district, is sold to M. Norton and J. F. Gahrin of Wheeling, W. Va., for \$15,000. J. T. Erickson will be in charge of the property. The Philadelphia smelter at Pueblo will handle the ore.

A new mill with a new process is being built at the western end of the Royal Gorge, west of Florence, by the Greenhorn M. & M. Co., which owns mining property near the mill, in proximity to a dike running through the chain of Greenhorn mountains, for treating copper ore.

GARFIELD COUNTY.

The Pochontas coal mine at Cardiff has been sold by Receiver Parks to A. V. Hunter of Leadville for \$23,300, and takes in all of the property of the Pochontas Coal M. Co., including the new tramway built last year. The mine has never paid expenses except under the management of Receiver Parks.

GILPIN COUNTY.

R. M. Collins, manager Scandia mine at Central City, reports the strike of a vein of ore running \$150 per ton.

Central City reports the Boston-Cleveland M. & M. Co. has bought the Morning Star property, at the head of Elkhorn gulch, for \$16,000.

The Gettysburg property at Gilpin will be worked this summer. Work has resumed on the Wizard tunnel at Gilpin.

Several men are locating mining claims at the upper end of Boulder park.—The Miners' Supply Works at Black Hawk is buying ore to ship to the National smelter, South Dakota.

J. H. Johnson will erect a new shaft building and install machinery on the Bant property, east of Black Hawk.

At Black Hawk machinery for the independent sampling works is in place.

The Cook shaft of the Boston & Denver Con. M. & M. Co. will be extended to a depth of 1200 feet, where connections can be made with lower workings of the Fisk and Gregory-Bobtail properties. Enough ore is being taken out to keep forty stamps dropping.

The Colorado Carr Co. has bought the Golden Fleece property for \$15,000 cash.

Supt. T. Dunstone at the Running Lode mine, below Black Hawk, has a station cut at the ninth level—a depth of 725 feet. Thirty-five men are working. The average monthly production of 150 tons of concentrating ores is treated at the Newton mill, Idaho Springs, and 80 tons of

smelting ores go to the local sampling works or direct to the smelters.

GUNNISON COUNTY.

Supt. J. C. Jensen at Forest Hill has the shaft down 350 feet and is producing enough ore to keep the fifty-ton mill busy. The ore is lead-zinc, carrying gold and silver. Thirty-two men are at work.

Gunnison reports that the Tomichi Valley Smelting Co. has resumed operations with its fifty-ton smelter near Whitepine. On the Colorado Mines Consolidated plant, on the Cochetopa, machinery will be put in. At the dump of the main tunnel it is estimated that there is 4000 tons of \$12 ore.

Near Gunnison the Dubois T. M. & M. Co. has resumed on the Dubois tunnel, now in 1260 feet, and which has cut several veins averaging \$10 gold per ton.

The Iron Cap mine, last year operated by the Grafflin Co., will be worked this season.

The Elko 50-ton concentrator, Elko district, is to be operated soon by the Rock Creek Investment Co.

A. C. Brownell will operate the Iron Bonnet mine on Gold hill, Tin Cup district.

W. W. Burr is operating the Brittle silver mine, near Woodstock, Tomichi district.

HUERFANO COUNTY.

Walsenberg reports great activity on the north side of Grayback mountain. Within a circuit of 2 miles from the Copper Bull mine, under the general management of C. O. Unfug, there are several outfits operating machine drills and compressors.

LA PLATA COUNTY.

The Neglected mine at Oro Fino is reported to show profits for April of \$17,000 from an output of four tons per day. There is stated to be a breast of 8 feet of ore in the drift which averages nine ounces gold per ton.

Durango reports shipment of one carload of high-grade ore per week by the Mountain Lily.

LAKE COUNTY.

The Leadville News-Dispatch says: "Mr. Mankuss has had two different mining agents call on him during the week and try to sell him the Helen Gould mine, which they claimed was the richest ore producer in the world. Mr. Mankuss holds the deed to the mine; Hensley & O'Brian hold the adjoining claims, so that the agents are evidently frauds."

The New Leadville M. Co. will put in a diamond drill on the O'Brian claim.

Leadville reports that on Sugar Loaf mountain Manager Horner of the Dinero Leasing Co. is developing the vein on a large scale. The shaft is 410 feet deep. Since taking hold over 1500 feet of stoping and development work has been done.

At Leadville, W. F. Crispell will reopen the old Oro mill.

Near Leadville the Arkansas Valley smelter, the largest in the State, will be enlarged and capacity for treating low-grade ores increased. One thousand tons of ore are now being treated daily. The improvement will enable the company to handle 1400 tons. New roasters will increase the roasting capacity to 400 tons daily.

The Fryer Hill M. Co. is pumping 1200 gallons of water per minute from the El Paso shaft, lowering the water 2 feet a day. Manager Newell expects by Sept. 1st to be shipping ore.

Mr. Ihseng, the American representative of the Vieille Montagne smelter of Belgium, the largest zinc plant in the world, is making an examination of the Leadville zinc situation with a view of making some contracts for zinc. The Belgian plant has not bought any ore there yet.

MESA COUNTY.

Near Grand Junction D. Bishop will superintend work on the Last Chance and Francis mines, taking out gold and copper ore.

OURAY COUNTY.

Near Ouray, the American-Nettle mine buildings were partially destroyed by fire on the 25th ult.

At Ouray the Home pyritic smelter will resume work next month.

PARK COUNTY.

Near Alma the Golden Era, owned by Dr. McLean, has a vein of ore 6 feet wide, affording 1500 feet of stoping ground above, fifty ounces lead, one-half ounce gold. The London mine recently paid a dividend of \$1.15.

SAGUACHE COUNTY.

The Little Sisters G. M. Co. are operating in the Bonanza district and have ore running \$13 per ton. This ore is treated by the smelters for nothing on account of the fluxing character of the ore. The ore carries a high percentage of lead.

The San Isabel mine, 3 miles north of Crestone, developing with air drills and good miners, with a tunnel in the mountain over 2000 feet, has cut the Bernard

vein at a depth of 600 feet. Assays from the outcroppings have given returns of \$8 and \$10 in gold and copper.

SAN JUAN COUNTY.

Near Silverton the Pittsburgh M. & M. Co., on Brown mountain, has bought the Kentucky Giant group, near Gray Copper falls, and will do development work thereon under the supervision of W. Riggs.

SAN MIGUEL COUNTY.

Telluride reports 200 feet of bedrock stripped at the Keystone placer. The new mill at the Tomboy will be finished next month.

In the Cincinnati, Columbla and Argentine mines, by the time the new mill is finished, considerable ore will be ready for extraction.

Near Telluride the manager of the Japan tunnel expects this month to lower the State record held by the Newhouse tunnel at Idaho Springs. The average distance made per day is 9 feet—2 feet more than ever driven in the San Juan country in the diorite or trachyte formation that prevails throughout the district. Two shafts are employed; the motive power is compressed air. The manager expects to drive over 300 feet this month.

Rodgers & Breckenridge have men on the Royal group, in Bridal Veil basin. The veins are 6 feet wide and carry gold, silver and lead.

The compressor bought from the Mel-drum Tunnel Co. by the Ophir Con. M. Co. is operating the Silver Bell machine drills for developing the Ida and Silver Bell.

SUMMIT COUNTY.

Mgr. A. M. Campbell of the Mine Developing Co. of Montezuma is shipping fine high-grade silver-lead ore.

Manager Stearns, Leadville, expects to open up work on the Klondike, in Clinton gulch. Nearly \$75,000 has been invested in this property by Chicago men.

Green Mountain is a new town on the Blue river, 40 miles north of Breckenridge, where a new gold camp has been opened up. There are two nearly parallel dikes of phonolite crosscut and intersected by fissures filled with porphyry, and from 10 to 40 feet wide. There are four companies and 30 prospectors at work.

W. A. Johnson has started up the Uthoff mine at Kokomo.

At Robinson the new smelter is running on ore from the Robinson mine. In operating the mine and smelter the Robinson Co. is employing 125 men.

The Ten-Mile Leasing Co. will sink its lower workings 200 feet deeper.

The Journal reports that at Swandyke the Gold Cup group of claims has passed into the hands of a California corporation, stocked at \$1,000,000. Under the terms of the transfer, the company is obligated to expend \$6000 on the property by December 31, 1902.

TELLER COUNTY.

(Special Correspondence.)—The mining public will be interested in the outcome of the celebrated mining case which is attracting national attention, known as the Hull City placer claim, and which President Roosevelt has interested himself in to the extent that he has read all of the papers pertaining to the case and assured James A. Ownsby, a mining man of Denver, Colo., that the case will be reopened and referred to a court of competent jurisdiction for trial. The territory in dispute is situated in the Cripple Creek district. The statements made by Mr. Ownsby and associates are that the territory in question was located as placer ground, when in fact it is lode claims or veins; that no placers have ever been found in the district, with but one exception. Some ten or twenty claims were located in the territory afterward known as the Hull City placer. The property so located was transferred to the Independence Town & Mining Co., which afterward became an applicant for a patent. The survey, supposed to have been made under the direction of the Pueblo Land Office, is attacked, and the charge is made that it was not legal, nor were the improvements properly appraised. In the contest which sprung up for possession there were a number of claims, including the Wilson Creek Con. M. & M. Co. When the contest reached the General Land Office the survey was set aside, because of the claim that it was improperly made, and that the improvements were not in accordance with the law. Mr. Ownsby secured options on the interests of all parties concerned, including the Wilson Creek Co. and the Independence Town & M. Co., with the idea of eventually perfecting a claim to all the lodes. He expended some \$87,000 in this connection. While the case was still pending the patent was issued, Mr. Ownsby claims, "upon misstatement of facts, misrepresentations and perjury."

An investigation of the facts leading up to the issuance of the patent was made by the department, and the charges of perjury and misrepresentation were substan-

lated. Special counsel was appointed to bring suit against the patentees, the special counsel being C. J. Hughes, Jr., and T. S. Dines of Denver. The case was compromised. Indictments were found against some of the participants in the scheme and the whole State became interested. An effort was made to have the men indicted nolle prosequed, but this proved unsuccessful. The Interior Department also refused to dismiss the proceedings which had been started against the patentees. Mr. Owensby endeavored to have the whole matter thrown into the courts, but the Attorney-General, Mr. Knox, refused to act. For this reason Mr. Owensby went direct to the President with his case. Should Mr. Owensby win his case it means that some prominent men of Colorado are liable to find themselves in serious trouble, and that the United States Government will receive about \$3,000,000. Mr. Owensby is represented by W. S. Teller, Denver, T. B. Reed of Maine and J. S. Blackburn of Kentucky. It will undoubtedly prove to be one of the most noted mining cases in the history of the Government.

Cripple Creek, June 28.

(Special Correspondence)—The Granite G. M. Co., D. L. McCarthy Supt., Victor, employs sixty men and will average 1000 tons of ore per month at a value of \$35 to \$40 per month. Mr. McCarthy expected to raise the output during the month of June to 1500 tons, but owing to the breakdown in the compressor at the La Bella plant, which supplies the Granite with air, they were obliged to remain idle for a few days, which will prevent them from making it 1500 tons.

Victor, June 24.

On the completion of their new working shaft Sept. 10th the El Paso Con. Co. will lease the entire southern area of their territory from the surface down to the tunnel level, 335 feet below the surface. The company will maintain its plant of machinery on the shaft, will give the lessees hoisting facilities, and they can buy machine drills if they desire to operate any.

Another Cripple Creek consolidation is proposed, the Big "4" Con. G. M. Co., New Century G. M. Co., Juanita G. M. Co., Transvaal G. M. Co. and Gladys A. M. Co. The new company will be known as the Amalgamated Gold Mines Co., capital stock \$25,000, incorporation under Wyoming laws.

The Granite and other mines which were supplied with air from the La Bella compressor at Goldfield are making up for lost time. When the breakdown occurred the Granite was outputting fifty tons per day, the ore running in carload lots \$50 a ton on an average. The breakdown did not affect the Golden Cycle, as there was broken a large tonnage. This mine is now outputting 125 tons a day.

The Bedford G. M. Co., in Bison Park, will put in a 20-stamp mill.

The Mineral Point G. M. Co. will build a 100-ton cyanide mill on their Copperhead property, Mineral Hill. They will begin work on their Joe Heath claim, on Bull hill, east of the Victor mine. A plant of machinery will be installed and the shaft sunk 300 feet.

A. H. Heller is building a cyanide plant on the Ironclad property near Cripple Creek.

W. S. Stratton has leased the Callie property on Gold hill for eighteen months.

At a depth of 760 feet connection is made between the Chicago-Cripple Creek tunnel and the Plymouth Rock on Ironclad hill. Ventilation for the mine and tunnel is now secured. The tunnel penetrates Globe and Ironclad hill 4200 feet.

In Cripple Creek the Moon-Anchor Co. has leased its Anna Rooney claim, adjoining the Conundrum of the Anchor-Leland Co., for two years at 20% royalties. The lessees will sink a new working shaft 200 feet.

The Doctor-Jack Pot Con. G. M. Co. has suspended work. All the men will be laid off from the Mattie D. vein.

At Victor, R. L. Patterson has started work on the dump of the old Victor mine. It has been previously worked over by hand, the present lessee will operate on a larger scale and wash and screen the rock. Tests show values of \$15 a ton.

The Little Sister G. M. Co. is operating on the southern slope of Battle mountain, adjoining Stratton's Independence. They are in ore that runs from \$5 up to \$50 per ton.

IDAHO.

Judge Beatty of the U. S. Circuit Court has dismissed the \$1,000,000 damage suit brought by Patrick Clark and others against the Buffalo Hump and Empire State Mining Companies. Clark charged Charles Sweeney of Boise with having used fraud and misrepresentation to purchase the Ella and Missing Link claims from him at a trivial price, when in reality they were of great value. He demanded the return of the claims, which

are valued at \$1,000,000. Judge Beatty, after hearing the arguments, ordered the suit dismissed. Clark will appeal.

BANNOCK COUNTY.

Pocatello reports a fight for the possession of the Belle Marsh copper mine on the recently opened Fort Hall reservation. Murray's men hold possession of the property with Winchester. Elliott says he will attempt to gain possession of the property. There is talk of one hundred prospectors and miners organized to assist him to take possession by force of arms.

BLAINE COUNTY.

J. B. Frank, manager Idaho Recovery Co., recovering values in tailings at Camas No. 2 mine and mill, Halley, by cyanide process, says the work that has been going on over five years will be ended Sept. 1.

Near Hailey final payment on the Hattie group of mines acquired by the Hollister syndicate will be made by James Black of Salt Lake.

Martin thinks that this year Lava creek district will go ahead. The Mayflower people are grading for the new stamp mill. Indiana people are putting in a smelter of 40 tons capacity, and employ about twenty men. There is the Alder Creek M. & M. Co. The building of the Mackay branch of the railroad will develop that part of Idaho. Arco, the railroad point, is 18 miles from Martin.

At the Rosetta mines on the South Boise and Big Smoky divide, F. R. Reed, the newly elected manager, has assumed charge of the property, and has ordered work discontinued until he can map out a plan of operations. C. C. Ruthrauff retains control of the company.

BOISE COUNTY.

First payment is made on placer ground on Boise river, above mouth of More creek, one-third purchase price, latter \$31,000, by New Hampshire and New York men. The company will put a dam in Boise river for an electric plant, fall 12 feet. Electrical power will run centrifugal pumps which will lift water to the placer ground, the bedrock of which is 30 feet above low water mark of the river. The water will be pumped 130 feet, giving pressure of 100 feet for mining purposes.

The Ingle Co., at Grimes Pass, is putting up a 60-ton Chile mill to be run by water power.

CUSTER COUNTY.

Near Mackay, in the mines of the White Knob Copper Co., the vein runs from 20 to 150 feet in width; average thickness of ore 30 feet. The smelter, which has a capacity of 600 tons of ore, will be blown in July 15. Preparations are being made to add two more furnaces of 200 tons daily capacity each, to give capacity of 1000 tons a day. There are 400 men on the payroll—200 being employed in the mines and 200 on the 12-mile electric railroad and at the smelter.

A subsequent report from Mackay states that last week the White Knob Copper M. Co. closed its mine, smelter and other enterprises and abandoned them indefinitely. The 300 employees will receive their pay in full and be discharged.

The new Supt. of the mines, F. Boyd, who suddenly displaced Supt. W. Darlington a month ago, says that the order to close came through him to J. A. D. Smith, Supt. of the smelter. Construction of the plant was begun last October. It includes an electric railway running up the side of White Knob mountain from the smelter to the mine, 30,000 feet of tunneling, 700 feet of shafting and a smelter with a daily capacity of 600 tons. It is estimated that \$1,000,000 has been invested in an effort to work the mountain of low-grade copper ore.

R. Macheth is Supt. Lucky Boy M. Co., Custer City. Eighty tons of ore go daily through the crushers.

OWYHEE COUNTY.

Manager Stevens of Silver City expects at the Addie mining property to have the mill running Aug. 10. The mill is planned to be automatic. The ore will be delivered directly from the mine tunnel to the rock breaker and grizzlies and fall thence into the bins, from which it will be let into the battery feeders, without handling. The depth from the car tracks, near the top of the mill, to the settler floor, is 46 feet.

SHOSHONE COUNTY.

The Mullan Mirror gives the following: The Cœur d'Alene mine owners and the smelting trust have agreed on the terms which will govern the output of the north Idaho lead mines for the next six months. The tonnage will be increased 20% and the price will remain 3½ cents a pound. The increased output will give employment to 150 more miners than are now at work in the district. The new deal went into effect on July 1. F. Burbidge of the Bunker Hill & Sullivan Co. and the Cœur d'Alene M. Co., working near Wardner, returned Wednesday from the lead conference in New York. "We wanted to

get an increased tonnage of 25% over the present restricted output," said Mr. Burbidge. "However, it was evident after our first conference that the smelting company would not accept such terms. Then the Cœur d'Alene mining men spent several days in New York discussing the matter among themselves, and at a later conference it took only a few minutes to close the arrangements on the basis of a 20% increase. That gives the mines a chance to produce 80% of what is assumed to be their normal production. For the first six months of the year the mines under contract with the smelting company were restricted to 66⅔% of their alleged normal tonnage. The Bunker Hill & Sullivan Co. is working 500 men; the Empire State-Idaho is working 175 at Wardner and 125 at Burke; the Morning has about 175; the Cœur d'Alene M. Co. 53; the Mammoth about 90 and the Standard and the Hecla about 250."

Wallace reports that under the new agreement the shipments of lead ores will again reach a point almost as high as at any time in the past.

At present the output of the district is 12,000 tons a month, the American Smelting & Refining Co. taking 10,000 tons and the Tacoma smelter 2000. Adding 20% to the amount taken by the trust will swell the shipments of the district to 14,000 tons a month, or 168,000 tons a year. During the year 1900 shipments ran up at one time to almost 18,000 tons a month, but the average for the year was only 171,412, or less than 3500 tons—2%—more than will be taken under the present contract. That was the year of greatest shipments, 1901 coming next with 148,890 tons. Ore shipped since the reduction of the output is worth more per ton than when the mines were running with a wide open market. The ore is being milled closer, giving a higher per cent of lead to the concentrates, due to better milling methods. An addition of each per cent to the lead contents of the concentrates means an addition of about \$4500 to the value of the month's shipment, and in some mills the increase has been as high as 5%. Thus, when the output was restricted, the mine owners had it within their power to add \$250,000 to the value of the year's output at a very trifling expense.

Local estimates are that the increased output will furnish employment to 400 more men.

The Wardner townsite case before the Cœur d'Alene land office has been won by the town. The applicants for patents of mining claims running across the town have appealed to the Secretary of the Interior. Register Budlong's decision gave the city the surface rights and the lode claim owners the ore in their claims. The claim patentees maintain the claims are worthless without surface rights to work them.

Work is being pushed by the Vindicator M. Co. 2 miles east of Mullan. The ledge is 10 feet wide 100 feet from the surface. The upper tunnel is in 375 feet and the lower tunnel 150 feet. It is a silver-lead proposition.

Pierce City reports that the Wild Rose mill's clean-up of 12 tons of ore showed 12½ pounds gold, valued at \$2300. The Wild Rose is 4 miles from Pierce City. From a 2-stamp prospecting mill clean-ups, aggregating \$15,000 are said to have been made.

The New York conferences between lead producers of the Cœur d'Alene district and the American Smelting Co. resulted in an agreement for the ensuing six months similar to that which has obtained heretofore.

WASHINGTON COUNTY.

Thunder Mountain reports that F. J. Conroy went to Thomasville, North Carolina, there bought a 100-stamp mill, and is sending it to the Belle of Thunder Mt. mine, all of which may be so. The assertion is also made that "a train of over thirty cars, with streamers attached," will carry the mill to Nampa. Just what the "streamers" are for is not stated.

E. D. Ford, manager Idaho Gold Col. mines, Black Lake, has three cars of tram fixtures, cable and pipe for the mill. The road is buried under snow. He has men plowing out the snow with a 16-inch plow and fourteen horses.

MONTANA.

The value of the gold, silver, copper and lead produced for the year 1901 was \$60,-387,619 01—\$4,802,717 39 gold, \$18,334,-422 26 silver, \$36,751,837.34 copper, \$498,-622.02 lead. As compared with the production of 1890 the decrease is about \$3,000,000, due to the lessened production of copper. Since the discovery of gold in Montana forty years ago about \$1,000,000,000 has been taken from the streams and mountains of the State.

BEAVERHEAD COUNTY.

Near Dewey the Ajax Mining Co. has bought the Climax mill, and are hauling it to their property in the Big Hole basin.

The Montana Power Transmission Co. are working twenty men on their reservoir and flume on Wise river.

Laughlin & Albers have sold their placer mine, near Argenta, to W. Hogan for \$3000.

BIG HORN COUNTY.

N. P. Stilson, manager Gold Reef M. Co., Greybull creek, has let a contract for driving a tunnel 150 feet on the vein.

CASCADE COUNTY.

P. Gibson, W. C. Conrad and T. C. Power have sold the Barker mine at Barker to New York men, who will resume work upon the property.

DEER LODGE COUNTY.

At Ophir the Avon M. Co., in the Ophir mine, have sunk 200 feet and have cross-cut the south drift 120 feet in ore, showing fine black sulphides and coarse ore which carries copper.

A contract has been let on the Snow-shoe to sink a shaft.

GRANITE COUNTY.

Healey & Sweeney have good ore in the Luxembourg mine, on the Georgetown flats.

Near Phillipsburg the Howard Copper Co. has ore carrying gold, silver, lead and copper.

JEFFERSON COUNTY.

W. A. Gallagher is taking good ore from his property, southeast of Jefferson City. The product goes to the East Helena smelter.

Longmaid Bros. will put a 100 H. P. bolting engine in place on the Elkhorn mine and 2300 feet wire cable.

Near Basin, C. J. Davis of the Buckeye concentrator will put the works in shape for a run on ore from the Buckeye. The mill is to be operated in connection with the concentrator.

E. W. Beattie proposes to the individual stockholders in the Basin & Bay State M. Co. to buy their holdings in the property, 22 miles from Butte. He offers to pay for the bonds at the rate of 83% flat, and give the stockholders \$3 per share for the stock, these payments to be conditional that he shall have 7500 shares of the stock and \$225,000 worth of the bonds.

Elkhorn reports strike of silver ore in the Elkhorn mine at the 450-foot level, of a stringer 8 inches wide, ore assaying 500 ounces to the ton. The stringer is being followed towards the foot wall, where it may widen out into one of the big chambers from which the Elkhorn took several hundred thousand ounces of silver.

Men are at work on the Baltimore claim, near Boulder.

LEWIS AND CLARKE COUNTY.

Near Helena, the Last Chance channel is found by P. R. Martin.

MADISON COUNTY.

Near Sheridan the Toledo properties have been sold to Eastern men, who will push work upon them. L. D. McCall of Chicago, president of the Bismarck and Nugget Gulch Con. M. Co., has closed the deal for \$40,000 spot cash. Mr. Ring will have charge of the mining operations at the Nugget gulch and Brandon mines; A. B. Knight will superintend the mill and smelter; F. B. Linderman is assayer for the company. The concentrator and furnace will be remodeled. Mr. McCall says his company is prepared to expend \$100,000 in development work.

The present terminus of the Northern Pacific road is at Alder. Two dredgers are in operation within 300 yards of the depot, one owned by the Chicago M. & Dev. Co., which is working a portion of the mining ground under lease from the Conroy Placer M. Co., which owns the ground and a large part of Alder gulch below Virginia City. The ground yields 20 cents per yard, and the dredger, which is an old one, is working 2½ yards a minute, working twenty-four hours. The company is building a dredger that will handle three times as much. The Madisonian says "the intention of the company in dredging the ground is to extract the gold and to replace the earth in such a manner that it may afterwards be used for farming purposes."

The Toledo mine, 3 miles from Sheridan, may be worked this summer.

The Copper Chief M. Co. reports a strike of a ledge of native copper 30 miles from Butte. The strike was the result of a crosscut at the 140-foot level. Assays show the ore will run 10% copper.

PARK COUNTY.

Work on the property owned by the Scotch Bonnet M. Co., Cooke City, will be resumed July 15, but no shipments will be made until next year, by which time it is expected that Cooke will have a railroad. In case the road is not built, however, the ore will be hauled by wagon to Gardiner, on the edge of the Yellowstone park, and shipped by rail to smelters. It will cost \$10 per ton to get the ore to the railroad. The product has a stated value of \$30 to \$40 per ton gold.

RAVALLI COUNTY.

At Hughes creek miners are making good clean-ups from placer ground. The Crandall Creek Placer Co. cleaned up about \$2300. Near the placer diggings are some copper claims, owned by Castner & Shannon, which are being developed.

SILVERBOW COUNTY.

M. Finlen says that on Jan. 26, 1901, he sold all his interest in the Minnie Healey property to the Boston & Montana M. Co. for \$139,500.

The Pacific mine, the first producing property in the new copper district east of Butte, is reported sold to the Butte Mine Exploration Co. for \$40,000.

NEVADA.

CHURCHILL COUNTY.

A company is organized to work borax and has 1000 acres in the marsh at the mouth of Cottonwood canyon.

ELKO COUNTY.

W. D. Higginbotham, manager White Rock Co., Elko, reports the first regular clean-up satisfactory.

ESMERALDA COUNTY.

J. N. Gardner of the Esmeralda Con. M. Co. will start the work on the company's mines near Hawthorne.

The second payment of \$10,000 has been made on the Pamlico-Lapanta group, Hawthorne district. J. A. Yerington is expected to resume work on the mine.

HUMBOLDT COUNTY.

Near Lovelock the Kennedy mill has started up on ores from the Imperial mine.

LINCOLN COUNTY.

J. Boyle is general manager Lenore M. Co., near Hardyville. He has an 8-stamp mill, thirty-ton capacity, and will blow the whistle the first time July 4th. The mill is of the 2-stamp battery variety, each stamp weighing 1000 pounds. It is on the Colorado river at Hardyville, 8 miles distant from the mine.

The manager of the Keystone mill at Sandy contemplates a much larger plant. In the Keystone mine the force of miners has been doubled in the past month.

E. F. Freudenthal, Supt. Manhattan M. Co., Pioche, reports a strike on the porphyry dike, which joins the Alps mine. Samples of ore average 2000 ounces in silver and \$12 in gold. The vein is 4 feet wide, lying between the porphyry and the quartzite.

NYE COUNTY.

C. D. Van Duzer has gone to organize a company to operate a group of claims in Tonopah.

The president of the Investors' Co. of San Francisco says, regarding the ores of Tonopah, that they have developed a process adapted to those ores, and are prepared to put up a \$65,000 plant if assured ore with which to maintain it. They have contracted with the lessees on the Tonopah Co.'s ledges to treat ores, but the company insists upon its right to designate by whom the output of the leases shall be treated. Accompanying the proposition is a schedule upon which the ores will be purchased on the ground.

Dick Patterson, the discoverer of the Lone Mountain mines, 20 miles south of Tonopah, says the property has been sold for \$160,000—\$10,000 down, \$50,000 to be paid in ninety days and the remainder on a specified date. Dick's share in the sale will be \$20,000 and 20,000 shares of stock in the new company. He received \$3000 of the first payment, the remainder of the \$10,000 going to the locator of the mine, Jack Darrrough, of Smoky valley. Dick Patterson is a Shoshone Indian, who says that he is going to travel and see the world on his money.

The Bonanza directs attention to the fact that a source of electric power lies within 100 miles of Tonopah by a route unimpeded for transmission wires; the rapids of the Owens river, Bishop, Inyo county, Cal., a volume of swiftly flowing water, could be utilized in a plant to develop 10,000 H. P., which in Tonopah would solve the problem of cheap light and power for pumping, hoisting, crushing and other industrial demands.

The Tonopah M. Co. has bought the Columbus coal mines, 40 miles from Tonopah. The coal is lignite, runs high in ash, but has heating properties.

J. A. Yerington has organized a company to take water 65 miles from Twin river into Tonopah, at an expense of \$300,000.

STOREY COUNTY.

At Virginia on the 1600 level of the Union shaft the joint Sierra Nevada and Union Con. crosscut from the main west drift is in 133 feet, with the face in porphyry. The Union Con. Co. has started west crosscut 3 from the south drift on this level at a point 500 feet south of the north line of the mine and advanced the same 14 feet in soft porphyry and clay.

In the Gould & Curry mine the north-westerly drift on the 425 level has been

advanced a total distance of 182 feet from the main west drift. The face is in soft porphyry.

In the Utah Con. mine the south drift started in surface tunnel No. 2 at a point 797 feet in is still in porphyry and quartz, the latter showing some value.

WASHOE COUNTY.

J. Sheehan, owner Crown Point mine, Olinghouse gulch, has finished milling ten tons that yielded a brick worth \$725.

Last week John Sparks of Reno gave G. S. Wedekind a check for \$150,000 in payment for the latter's mine in the district of that name north of Reno.

WHITE PINE COUNTY.

Cherry Creek reports new strikes and a new camp, Cucamongo, 4 miles south of Egan canyon. Manager W. H. Brown of the North Mountain M. Co. will prospect its vein from a new opening. The management of the Glasgow & Western is blocking out ore.

NEW MEXICO.

GRANT COUNTY.

The Aberdeen Copper Co. at Lordsburg is sinking shafts on its mining properties in the Lordsburg district.

The Granite Lead mine at Stein's Pass has been sold for \$30,000 to New York men.

SANTA FE COUNTY.

The McKinley G. M. Co. is milling ore at the Mayo mill, Golden.

The smelter at Cerrillos is receiving ore from all sections of the Territory.

The Calaveras M. Co. has shipped a carload of copper ore from Alamogordo to the smelter at El Paso. This ore is from the Caballero canyon.

SIERRA COUNTY.

Fairview reports activity in mining in the Chloride and the Hermosa mining districts; wages \$3 per day and a scarcity of men. C. T. Brown of Socorro, secretary of the School of Mines, has been in Fairview examining work being done on the property of the Mines Development Association, of which he is general manager.

OREGON.

BAKER COUNTY.

At Sumpter the North Pole will put in twenty stamps in addition to the present twenty stamps, and a small cyanide plant. Another strike is reported in the Red Boy mine.

The Imperial mine of Cable Cove is shipping high-grade ore.

J. N. Esselstyn, manager the Mountain View, is expecting to strike the vein soon.

The North Pole mine will add twenty stamps to its mill.

At the Phoenix mine, Manager C. Parker will have his own mill of twenty stamps next month and will then double the output.

At the Badger mine, Susanville district, the Badger Co. is erecting a 100-ton concentrating plant and employs about the mine and mill fifty men. The concentrator will be operating this month.

GRANT COUNTY.

Supt. E. P. Kennedy will have a 75-ton concentrator on the Badger mine at Susanville by Aug. 1, when work will be started on several thousand tons of ore on the dump. Thirty men are employed.

The Stockton at Susanville is down 250 feet and is working ten men.

JOSEPHINE COUNTY.

Near Grants Pass the Champion M. Co., Williams district, will put in a five-ton air compressor and other machinery and improvements at the Rising Star mine. The company will run a tunnel in the mountain 3000 feet to tap the famous Tip-Top ledge.

LANE COUNTY.

Near Cottage Grove the 10-stamp mill of the Helena has started up.

MALHEUR COUNTY.

O. E. Head says near Dell he has found several pockets of zinc ore.

SOUTH DAKOTA.

HUGHES COUNTY.

At Butte, Mont., articles of incorporation of the Montana Smelting & Refining Co. have been filed. Capital stock, \$3,000,000; principal place of business, Pierre; trustees, M. Stageman, New York City, G. W. Sanders, Pierre, S. D., J. Johnson, Butte, Mont.

LAWRENCE COUNTY.

Deadwood wants the meeting of the International Mining Congress next year.

At the Spearfish cyanide property, Johnson gulch, near Deadwood, seventy men are employed in the mine and mill. One hundred and twenty-five tons of ore are treated in ten hours. J. Bunk is foreman.

At Cyanide the Spearfish M. Co. and the Deadwood Standard are operating their cyanide works at full capacity with high extraction of gold.

The Dakota M. & M. Co. of Deadwood

will increase the capacity of the cyanide plant in Deadwood from 100 tons per day to 200 tons.

A recent discovery of a vein of silver ore by C. Brown at Carbonate is reported. It is of white quartz, intermingled with iron and graphite, and carrying silver in the form of a black sulphide. Samples gave returns of 100 to 400 ounces. The formation is slate, porphyry cap; veins of graphite and plumbago exposed.

PENNINGTON COUNTY.

At Hill City Manager Daily of the Aberdeen G. M. Co. has a good ledge, and will sink further.—The Gopher M. Co., under the management of T. J. Arundel, is developing the property.—E. C. Johnson has completed the machinery on his tin property and development continues.

Work has been stopped in the main shaft of the Columbia M. & M. Co. at Rochford by the inflow of water. The company will put in a steam hoist, pump, air compressor and machine drills.

PERRY COUNTY.

The Bee Lode M. & M. Co. will extend its operations in the vicinity of Perry, the shaft to be put down another 80 feet. The Bee Lode Co. owns ten claims, joining property of the Clover Leaf M. Co.

UTAH.

Utah smelters report scarcity of men and say that they could give present employment to 200 more men.

During 1901 the value of the gold, silver, lead and copper produced was \$27,091,709, divided as follows: Gold, fine ounces, 184,803; silver, fine ounces, 11,319,860; copper, fine pounds, 26,931,888; lead, fine pounds, 99,102,516.

BEAVER COUNTY.

At Milford, Supt. Holdaway is in charge of the Klondike claims of the Klondike C. M. Co.

C. D. Rollins, foreman Copper Ranch mine at Jewel Mound, has a 12-foot body of ore that carries 60% iron and values in copper.

The Revenue M. Co. will put a concentrator on its property in Pine Grove district. The mill product will be hauled to the railroad at Frisco.

Material for the Majestic Co.'s smelter at Milford will be ready to forward this month.

IRON COUNTY.

The Ophir of Stateline on March 1 placed a mortgage for \$100,000 to secure the payment of 200 bonds of \$500 each, drawing interest at the rate of 5%.

JUAB COUNTY.

J. H. McChrystal, superintendent Godiva mine, Eureka, says that the property closed down July 1st for an indefinite period. The cause assigned, according to the Tintic Miner, is the disinclination of the management to accede to the demands of the A. S. & E. Co. "We have in the Godiva 150,000 tons fluxing ore that carries 10% to 12% lead, fifteen ounces silver and \$1 in gold, but have been unable to find a profitable market for it." The Tetro, which has been getting ore from the Godiva to operate its hoisting and drilling machinery, will be obliged to seek it from another source or install a plant of its own.

SALT LAKE COUNTY.

Manager M. C. Fox of the Storey group at Bingham is putting in increased mechanical facilities.

Supt. R. W. Rogers is pushing the air shaft on the Bingham Con.'s Dalton & Lark group of mines at Bingham. It is 4x7 feet in the clear. From its portal the main tunnel has advanced 3300 feet, 1200 feet from the station established at the bottom of the airshaft.

The Bingham Con. smelter, Bingham Junction, is to have a steel stack weighing 110,000 pounds, 230 feet high and 12-foot base; diameter, 8 feet at top.

The air compressor for sixty drills at the properties of the U. S. M. Co. at Bingham is in place. The bins at the Rio Grande terminal are finished for delivery of 1000 tons daily.

SUMMIT COUNTY.

Manager M. Sommer, the Park gold King, Park City, has fifteen claims adjoining the Midnight Sun and Silver Bell, and will put down a shaft.

The capacity of the concentrator of the Daly-Judge M. Co. at Park City is to be tripled and twenty-four new concentrators will be put in. Two hundred are on the payroll.

Mgr. T. Roscamp has resumed work on the Cornucopia mine, near Park City.

At Park City the Record reports Manager J. J. Daly of the Anchor mine about to open up the Bonanza Flat properties through the lower levels of the Anchor. Drifts from 700, 1200 and 1400 levels of the Anchor are being pushed toward the Daly-Judge ground; the main drift is now in over 2000 feet. The company has de-

vised to treble the present capacity of their mill, making it capable of treating 300 tons daily. In addition to the enlarged mill within a year a zinc mill, to be located just below the present mill site, will be built to handle the tailings and middlings. The output is netting the company \$30,000 per month.

TOOELE COUNTY.

The mercury deposits that first gave the camp of Mercur its name are showing up again bigger than ever in the Sacramento mine workings. Manager Glen R. Bothwell says the mercurial ores had been followed by Supt. Cochler 35 feet; the width was 8 feet, although no crosscut has yet been run. The ore appears on top, sides and bottom and is exposed in the face of drift, and under the scratch of a knife blade or pick becomes as red as vermilion. Samples show a valuation of \$408 per ton in quicksilver and gold. The management, before ordering the construction of a retort with which to reduce the quicksilver to commercial form, will experiment a little.

Mercur will be rebuilt and in better shape than before the fire.

At Stockton, the management of the Honerine has bought 960 acres extending from Terminus, for \$8500. The ground gives chance for the long tunnel through which the ore bearing zone at Stockton is to be drained.

WASHINGTON.

Work on the topographic survey of the State of Washington was recently resumed by the U. S. Geological Survey. A party was organized at Spokane July 1 by G. T. Hawkins to extend existing triangulation in the vicinity of Spokane southward to cover the territory between latitude 46° 00'—47° 30' and longitude 117° 00'—117° 30'. This triangulation is preliminary to the detailed mapping of the above territory, which includes portions of Whitman, Asotin and Garfield counties, this State, and Latah and Nez Perce counties, Idaho. Included within the area are the towns of Colfax and Asotin, this State, and Moscow and Lewiston in Idaho. It is expected that the triangulation will soon be followed by the topographic mapping, the results of which, when completed, will be issued in the form of three map sheets, each representing a quadrangle, or 30' of latitude and 30' of longitude.

Topographic map sheets of parts of this State already issued by the U. S. Geological Survey are Tacoma, Seattle, Mt. Stuart, Glacier Peak, Stillaguamish, Ellensburg and Spokane and a small portion of Clarke county. These maps are now available at 5 cents a copy. Orders should be addressed to the director of the U. S. Geological Survey, Washington, D. C.

WYOMING.

CARBON COUNTY.

Denver reports \$20,000,000 is represented in a consolidation effected in Wyoming, the new organization to be known as the North American C. Co. Among the directors are Joseph Seep, vice-president Standard Oil Co.; John S. Cary, president Mine & Smelter S. Co.; P. Collins, Tidewater P. L. Co.; W. G. Emerson and C. E. Knapp, general manager Boston-Wyoming smelter at Grand Encampment, Wyo. The properties to be merged are the Boston-Wyoming Smelter Co., Southern Encampment Townsite Co.; Frambush Waterworks Co., Emerson Electric Co., and the Ferris-Haggerty Copper M. Co. It is said there are several mining properties that will furnish as much ore to the smelter as will the Ferris-Haggerty. The new corporation has let a contract to the Mine & Smelter S. Co. of Denver for enlarging the present smelter plant from a 100-ton to a 500-ton daily capacity, installment of a concentrator capable of handling 500 tons of ore daily, and a converter to manufacture copper matte into blister copper.

Encampment reports that the Ferris-Haggerty C. M. Co. refused the merger proposition on a basis of \$500,000 in cash and \$500,000 in consolidated stock.

Near Battle Lake, T. J. McCarthy has sold 65% of the Big Chief property for \$25,000.

FOREIGN.

BRITISH COLUMBIA.

The Granby smelter has been offered a contract to treat 650 tons of Australian matte monthly.

At Ymir, Manager Popkiss of the Ymir G. Mines, Ltd., and E. C. Hooper of the engineering firm of Beowick, Moring & Co., are making investigation of the Ymir mine. A full complement of eighty stamps will be run again; pay ore has been reached in the drift at the 1000-foot level.

The Bosun mine, of the Slocan, has shipped to Antwerp, Belgium, for smelting, a carload of zinc ore.

N. S. Clarke, manager Eureka mining properties, Quatsino Sound, has men surveying for the aerial tramway from the

beach to the mines—4300 feet; the work will soon be started. On the completion of this work an air compressor will be installed. There is 10,000 H. P. available.

Rossland reports success in the treatment of the Le Roi's low-grade ore by the Elmore oil concentration process. Five tons were sent to the Elmore Co.'s works at London to be experimented upon. The ore carried about 1% copper and the reports show that it was concentrated 12 into 1 into an ore carrying 6% copper. The process consists in crushing the ores by stamp mill to 30-mesh size. The crushed ore is mixed thoroughly with petroleum refuse. The copper sulphides in the ore are taken up by the oil. Water is introduced and the oil carrying the copper sulphides rises to the surface. The scum thus formed is skimmed away and the oil is separated mechanically from the copper sulphides. About a gallon of oil to the ton of crude ore is lost in the treatment—not completely lost, for it remains in the concentrates and serves as fuel in the furnace when the concentrates are smelted. It is conceded that the cost of concentrating the ore will not exceed 75 cents a ton, aside from the royalty. The great gain is in the cost of smelting, as only one ton of concentrates would need be smelted, instead of twelve tons of crude ore.

In the Lardeau district the Gold Finch free-gold property at Goldfields is sold to the Northwest Dev. Syndicate for \$25,000. The new owners will put in a stamp mill in connection with their electric plant.

From Rossland the Columbia-Kootenay mine is making test shipments to the Trail smelter.

At Fairview, C. Ostenburg, manager Stemwinder mine, has the results of two mill runs—one of 200 tons from the main vein, which returned values of \$3.10 per ton in bullion and \$2.16 in concentrates; average loss in tailings 90 cents per ton. The second run, on 350 tons from the main vein and 150 tons from the north vein, gave a return of bullion \$1.21 per ton and concentrates \$2.06—the average loss in tailings \$1.16 per ton. The cost of mining the ore and delivering it at the mill is \$1.75 per ton. He has overcome a difficulty previously experienced in cyaniding the concentrates by a contrivance of his separating the galena from the pyrites and admitting of the latter being treated on the spot, the galena concentrates being shipped. The stamp mill is now running forty stamps and milling 100 tons of ore daily. Twenty stamps will be added from the Smuggler mill. Mining is in progress at three levels; thirty men are on the payroll.

F. W. C. Whyte, general manager Trail Creek coal mines, recently bought by the Amalgamated Copper M. Co., has begun active development on the property. Railroad spurs are being built and a town is springing up.

H. L. Frank of Butte, Mont., denies the recent report that he sold his interest in the coal mines at Frank, Crow's Nest Pass district.

A consignment of pig lead was made to Winnipeg on June 28th by the Trail smelter, the first pig lead produced on a commercial scale by electricity. Plans are being prepared for a plant which will turn out fifty tons of pig lead daily.

W. W. Warner, Supt. Wonderful group, Sandon, says there is a strike there, distinct from the other levels, and 200 feet farther west, a mixture of galena and carbonates.

The report of Manager J. MacKenzie on the condition of the Le Roi at Rossland for April is reported in part as follows: "The gross value of the ore shipped from the mine was \$262,320, equal to a value per ton of \$10.24. From this deduct difference between gross value and refiners' settlement rates and interest on gold and silver values for ninety days and copper sixty days, or \$1.74, which gives a net value per ton of ore of \$8.50. The net value of 255,931 tons of ore was \$217,544. From this deduct total cost of mining, or \$80,827, which gives \$136,717. From this deduct cost of smelting, freight and treatment at \$4.63 per ton, or \$118,498, which gives a total net profit for the month of \$18,219."

The British Columbia Coal Co. will put in a diamond drill plant on its coal properties, comprising 11,000 acres on the north fork of Kettle river, 60 miles north of Grand Forks.

MEXICO.

SONORA.

The Gran Provedora de Cobre M. Co. is about to begin work on its copper properties near La Calera, Altar district; W. E. Hefty of Phoenix, Ariz., is manager.

At the Cananea camp, Sonora, there are seven hot blast furnaces, total capacity 2500 tons ore per day. A company has been formed to extend the Cananea Railroad a distance of 600 miles to Topolobampo.

The projected smelting plant to be built at Guaymas is locally credited with an in-

tended daily capacity of 1000 tons of ore. L. Cloud is general manager Transvaal Copper M. Co. The property is 35 miles west of Cumpas.

SOUTH AFRICA.

At Pretoria, June 9, a proclamation was issued repealing the measure passed by the late Transvaal Volksraad which imposed a tax of 5% on the net profits of mines, and in place thereof imposing a tax of 10% on the net produce obtained from the working of claims, mynpatches and other gold-bearing grounds in the colony. Such net produce is to be taken as the value of the gold produced after deduction of the cost of production and of the sums allowed for the exhaustion of capital, as provided in the proclamation. It is expected that the new duty, which is, like the old one, a percentage on output, not profits, and therefore much smaller than it seems, is accompanied by the break-up of the dynamite monopoly and other contrivances. The added duty on mine products will be compensated by remissions of taxation elsewhere, and by honest administration generally.

May returns, as furnished the London Mining Journal, show considerable progress in the Transvaal, as shown in some detail, as follows:

Angelo Gold: May crushing, 7141 tons crushed, recovered 2059 ounces; 5674 tons treated by cyanide, recovered 1861 ounces; total ounces, 3920.

Bonanza: May results: Mill—Crushed 8107 tons, obtained 4821 ounces. Cyanide and slimes works—Treated 8107 tons, yielding 2369 ounces; total, 7190 ounces of fine gold; profit, £20,000.

City and Suburban Gold: Crushing for May, 5164 ounces; profit, £10,755.

Crown Deep: May results: Sixty-five stamps, working 29 days 8 hours, crushed 9684 tons; yield, 2487 ounces; 6560 tons of sands and concentrates treated by cyanide works; yield, 1628 ounces; 2664 tons of slimes treated; yield, 142 ounces; total yield, 4258 ounces fine gold; estimated profit, £6400.

Crown Reef Gold: May results: Mill, 4649 ounces; cyanide works, 2378 ounces; slimes works, 268 ounces; total, 7295 ounces; working expenditure and revenue, 11,637 tons milled; to mining, transport, milling, cyanide, treatment of slimes, general charges, maintenance and mine development, £14,757; profit, £16,230; by gold account, 4649 ounces from mill (£19,748), 2378 ounces from cyanide works (£10,099), 268 ounces from slimes works (£1140); total, £30,987; revenue per ton crushed, £21.33 3.07d; cost per ton crushed, £15s 4.34d; profit per ton crushed, £17s 10.73d.

Driefontein Con.: May crushing: Sixty stamps crushed 8254 tons; recovered, 2063 ounces; treated by cyanide, 6730 tons; recovered, 2380 ounces; total, 4443 ounces.

Durban-Roodepoort Gold: June 6—May results: Quartz milled, 6230 tons; fifty stamps, 27 days, 3281 ounces; tailings treated, 4311 tons; fifty stamps, 27 days, 1084 ounces; total, 4365 ounces.

Ferreira Deep: May: Fifty stamps, working 29 days 11 hours, crushed 8248 tons; yield, 2858 ounces; treated by cyanide works, 4800 tons of sands and concentrates; yield, 1622 ounces; slimes treated, 2128 tons; yield, 156 ounces; total yield, 4637 ounces fine gold; estimated profit, £12,000.

Goldenhuis Deep: May: One hundred and thirty stamps, working 30 days 11 hours, crushed 17,600 tons; yield, 4825 ounces; treated by cyanide works, 14,238 tons of sands and concentrates; yield, 2674 ounces; slimes treated, 3454 tons; yield, 292 ounces; total yield, 7792 ounces fine gold; estimated profit, £16,300.

Goldenhuis Estate: May: Crushed (sixty stamps) 9594 tons; obtained from mill, 2827 ounces; obtained from tailings by cyanide, 1696 ounces; obtained from slimes, 475 ounces; total, 4998 ounces of fine gold; profit, £11,360.

Glen Deep: May: Forty stamps, working 30 days 20 hours, crushed 7100 tons, yielding 1226 ounces; treated by cyanide works, 5680 tons of sands and concentrates; yield, 832 ounces; 2000 tons of slimes treated yielded 175 ounces; total yield, 2234 ounces fine gold; estimated profit, £2200.

Henry Nourse Gold: May: 3716 ounces; profit, £5306.

Jumpers Deep: May: Sixty stamps, working 30 days 1 hour, crushed 9993 tons; yield, 2183 ounces; treated by cyanide works, 6800 tons of sands and concentrates; yield, 1163 ounces; slimes treated, 3087 tons; yield, 167 ounces; total yield, 3504 ounces fine gold; estimated profit, £2600.

Lancaster West Gold: May: Forty stamps, running 29 days, crushed 6806 tons, yielding 1874 ounces fine gold. From cyanide works 4839 tons were treated, yielding 719 ounces fine gold; estimated profit, £3416.

Langlaagte Deep: May: Seventy stamps, working 31 days 4 hours, crushed 11,396 tons; yield, 2882 ounces; treated by cyanide works, 9054 tons of sands and con-

centrates; yield, 1378 ounces; slimes treated, 2380 tons; yield, 96 ounces; total yield, 4357 ounces fine gold; estimated profit, £5400.

May Con. Gold: May: Fifty stamps, running 30 days, crushed 7650 tons, yielding 2627 ounces. From cyanide works, 5160 tons were treated, yielding 1220 ounces. From slimes works 1710 tons were treated, yielding 206 ounces. Total, 4053 ounces fine gold; estimated profit, £7337.

New Comet Gold: May: Fifty stamps crushed 5554 tons, recovered 1171 ounces; 4170 tons treated by cyanide, recovered 803 ounces; total, 1974 ounces.

New Goch Gold: May: Forty stamps running out of sixty, as follows: 1418 ounces from 6035 tons of ore crushed, 681 ounces from cyanide, 733 ounces from concentrates, 38 ounces from by-products; total, 2870 ounces of fine gold; profit, £2623.

New Primrose Gold: May, 4187 ounces; profit, £6000; eighty stamps, 27 days.

Nourse Deep: May: Fifty-five stamps, working 29 days 5 hours, crushed 7777 tons; yield, 1181 ounces; 6263 tons of sands and concentrates treated by cyanide works yielded 827 ounces; 2100 tons of slimes treated yielded 102 ounces; total, 2111 ounces fine gold; estimated profit, £400.

Riefontein "A": May: 2608 ounces; profit, £3850; thirty stamps, 28 days.

Robinson Deep: May: Crushed 7964 tons, yielding 4015 ounces.

Robinson Gold: May: Sixty stamps crushed 7912 tons, yielding 5239 ounces; tailings by cyanide, 1528 ounces; own concentrates (by chlorination), 750 ounces; total, 7517 ounces of fine gold; net profit, £20,000.

Rodepoort United Main Reef Gold: Twenty-five stamps running out of seventy for 144 days during May; 691 ounces of fine gold have been obtained from 3000 tons of ore crushed; no clean-up was made from the cyanide works during the period stated.

Rose Deep: May: Seventy-five stamps working 29 days crushed 11,700 tons, yielding 2845 ounces; 9600 tons of sands and concentrates treated by cyanide works, yielding 1892 ounces; 2386 tons of slimes treated, yielding 156 ounces; total yield, 4894 ounces fine gold; estimated profit, £8100.

Sheba Gold: June 9: Permission has been granted to resume work, supplies being sent forward slowly; mining labor is scarce; will commence as soon as possible.

Simmer and Jack Proprietary: Total amount of ore crushed since commencement of crushing to end of May, 13,069 tons, yielding 3410 ounces.

Treasury Gold: May: 3940 ounces from 7800 tons crushed; profit, £8650.

Village Main Reef Gold: May: Sixty-five stamps ran 29 days; total yield from all sources, approximately, 4897 ounces; estimated profit, £7200.

Globe and Phoenix Gold (Rhodesia): May: Twenty-five stamps ran 28 days, crushed 3910 tons of ore; duty per stamp per day, 5.55 tons, yielding 3128 ounces bullion, equal to 16 dwts. per ton. Tailings—Average assay value per ton, 2.54 dwts. fine gold. Cyanide—Tons treated, 2450, yielding 277 ounces bullion, equal to 1.35 dwts. fine gold, per ton. Total gold for month, 3405 ounces. Twenty-five stamps still running.

THE KLONDIKE.

On the 27th ult. the steamer Dolphin arrived at Seattle, Wash., from Skaguay, bringing twelve large boxes of gold dust valued at \$1,000,000, the largest shipment made this season, consigned to banks and the assay office. There were eighty passengers and but few individual holders of gold dust. Another consignment of \$1,000,000 is expected on the steamer St. Paul.

Late Dawson advices state that C. E. Carbanneau and A. C. Willis have gone to Paris to conclude the largest deal ever made in the Klondike—fifteen gold mining claims belonging to the company.

The Dolphin, from Skaguay, brought \$1,000,000, shipped by Dawson miners.

Commercial Paragraphs.

THE Cleveland Pneumatic Tool Co. have appointed the Compressed Air Machinery Co. of San Francisco, Cal., to represent them on the Pacific coast.

THE Allis-Chalmers Co., through its Pacific coast representative, Geo. E. Ames, has the contract for the new hoisting plant at the Kennedy mine, Amador county, Cal., where a depth of 4000 feet is projected.

THE Colorado Iron Works Co., Denver, Colo., report the following sales: One 10-stamp, 1000-pound wet crushing mill for the Eureka Exploration Co., Silverton, Colo.; one 60-stamp, 1000-pound cyanide plant, erected complete, ready for operations, for the Hidden Fortune G. M. Co., Lead City, S. D.; iron work for one Nesmith crude oil hot blast stove for the

Monde Nickel Co., Ontario, Canada; iron work for one reverberatory roasting furnace for the Metal Volatilization Co., Denver, Colo.; one silver-lead smelting plant, with blast furnace 36x90 inches, for Jose S. Diaz, Guadalajara, Mexico.

A STEAM RAILWAY 40 miles long, the Cincinnati, Georgetown & Portsmouth Ry., is shortly to be converted from steam to electric traction. The Tennis Railway Equipment Co., who has the contract, has recently purchased from the Westinghouse Electric & Mfg. Co. two 600 KW. A. C. generators, and a number of 300 KW. rotary converters for supplying current to the line.

THE Pneumatic Cyanide process is to be used in the Hidden Treasure mill, Deadwood, South Dakota, a 180-stamp mill to be erected in three sections of sixty stamps each; the mill will have a capacity of 500 tons per day; also in the 100-ton plant of the Tobacco G. M. Co., Lake City, Colorado, now being erected; and in the 100-ton mill of the Sanger G. M. & M. Co., Monte Vista, Colo. The Pneumatic Co. of Denver, Colo., is also figuring on one other 500-ton mill.

Personal.

T. R. GARNIER is Supt. Osceola mine, Allegheny, Cal.

F. C. EASTON is Supt. Tabor mine, Gibsonville, Cal.

J. V. LANE is Supt. Mountain View G. M. Co., Fay, Nev.

L. M. TEALE is Supt. Yo Tambien mine, Globe, Ariz.

F. S. CHILLSON is Supt. Contention mine, Sonora, Cal.

SAMUEL NEWHOUSE has returned from New York to Utah.

A. B. GREEN is foreman Smuggler mine, Dunton, Colo.

E. F. CONANT is Supt. Santa Rita mine, Cripple Creek, Colo.

GEO. LYNN is assistant Supt. Golden Era mine, Columbia, Cal.

O. H. BROWN is Supt. Spearfish cyanide mill near Deadwood, S. D.

LYTTLETON PRICE, SR., has gone to Thunder Mountain, Idaho.

J. S. SULLIVAN is manager Chihuahua M. Co., Chihuahua, Mexico.

W. L. WATTS has returned from San Francisco to Los Angeles, Cal.

C. E. WATSON has been appointed Supt. Belmont mine, Tonopah, Nev.

A. P. WALBRIDGE has returned from California to Phoenix, Arizona.

C. C. RUTHRAUFF is general manager Rosetta M. Co., Hailey, Idaho.

F. W. DUNN is now manager Quartette mine and mill, Searchlight, Nev.

C. C. SHAW has resigned as foreman Pittsburgh M. Co., Caribou, Idaho.

S. T. PETERSON is general manager of the Nevada Co. mines, Austin, Nev.

E. L. SHAFNER, president International Mining Congress, is in Butte, Mont.

C. E. KNOX is manager Mispah Extension Co.'s property, Tonopah, Nev.

J. E. PRICE of Denver is examining mining property at Fort Jones, Cal.

F. C. PEREU is manager Southern Nevada M. & M. Co., Searchlight, Nev.

W. G. NEBEKER has returned from Pocatello, Idaho, to Salt Lake, Utah.

R. H. TERHUNE is operating the Tomichi Valley Smelter, White Pine, Colo.

J. D. FRESH, general manager Verde Grande M. Co., is in Los Angeles, Cal.

E. C. LOFTUS, late Supt. of the App. Quartz, Cal., will locate in San Francisco.

ROBERT ANGUS has been appointed manager Great Britain mine, Kaslo, B. C.

F. H. COLLINS, assistant manager Republic Con. G. M. Co., is at Idaho Springs, Colo.

C. M. DULL has returned from Salvador, South America, to Salt Lake City, Utah.

CHARLES S. PALMER succeeds R. Chauvenet as president Golden, Colo., School of Mines.

R. M. COLLINS, manager Scandia mine, Central City, Colo., has returned from Denver.

DAVID T. DAY AND J. T. KEMP are investigating Wyoming mines in search of platinum.

RICHARD GUENTHER, Supt. Yankee Con., Tintic, has returned there from California.

A. F. JUDSON has returned to Los Angeles from an inspection of Julian, Cal., mines.

E. C. RUST has returned from San Francisco to the Rawhide mine, Tuolumne county, Cal.

J. A. CASHION is superintendent of construction on the Prescott & Eastern,

which is being extended from Mayer to Crown King, Arizona.

L. A. DUNHAM, manager Clifton Con. G. M. Co., Clifton, Ariz., has returned from Denver.

E. I. HOLLAND, superintendent Good Hope M. Co., Phillipsburg, Montana, is in San Francisco.

ROBT. FROST will resume superintendency of the Six Eagles mine, Loomis, Wash., July 20th.

GEO. W. CROWE of Tucson, Ariz., says he is going to build large reduction works at Guaymas, Mexico.

R. A. PEREZ, assayer and analytical chemist of Los Angeles, is at Elsinore, Riverside county, Cal.

S. W. TRAYLOR of the Colorado Iron Works Co. has returned from White Pine, Nev., to New York City.

G. K. FISCHER is superintending the construction United States Co.'s smelter, near Salt Lake City, Utah.

A. LAFAYE, who has been working the Midnight mine, Clifton, Arizona, has returned to Salt Lake City, Utah.

C. B. HILL, president Pacific Con. M. Co., Pyramid lake, Nev., has gone to New York, to return in September.

EUGENE RUG is superintending operations at Nugget Gulch M. Co., Nugget Gulch, Madison county, Mont.

W. B. McDONALD took charge of the American Smelting & Refining Co.'s interests in Leadville, Colo., July 1st.

A. H. ELFTMAN, managing director Miller M. Co., Brownsville, Yuba county, Cal., has gone to Silverton, Colo.

J. J. WYATT is manager Desert Queen G. Co., Prosperity Co. and Verde G. & C. Co., Quartzsite, Yuma county, Ariz.

E. H. BENJAMIN, secretary California Miners' Association, has returned to San Francisco from El Dorado county, Cal.

W. J. BLADE is now Supt. Cripple Creek & Idaho Springs M. Co.'s property, the French Flag mine, Idaho Springs, Colo.

PETER MORGENSEN, engineer Monterey plant American Smelting & Refining Co., has gone on a five months' trip to Europe.

W. P. KINNEY will tour Colorado, collecting specimens for that State's gold, silver, copper and lead exhibit at the St. Louis Exposition in '04.

A. R. WILFLEY has returned to Denver, Colo., from Washington, Ariz., where he has been starting up the new mill and smelter at the Pride of the West mine.

C. P. COLLINS of Bradford, Pa., is in Encampment, Wyo. He is interested in the North American Copper Co., which has just purchased the smelter at Encampment.

CAPT. JAMES OPIE has been appointed manager Calumet & Hecla mine, in Michigan, to succeed Capt. Thomas Hoatson, who resigned to take charge of northern Michigan property.

F. L. NASON, Supt. Silver Pick mine, Mt. Wilson, San Miguel county, Colo., has written a novel, "To the End of the Trail," replete with interest and local color, ending tragically.

Books Received.

"The Hydro-Metallurgy of Copper," octavo, 228 pages, illustrated, M. Eisler, published in London by Crosby, Lockwood & Co.; in New York by D. Van Nostrand Co.; price \$4.50. This is a new and valuable work, treating on wet extraction of copper ores. Much has recently appeared in the pages of this journal, and the above work ably supplements the technical articles that have been of such interest to so many readers. The chapters on "applicability of the hydro-metallurgical treatment of copper," "the production of copper from sulphates," "the production of copper chlorides by wet process," "the precipitation of copper," "the refining of cement copper," and "the manufacture of copper vitriol" are among the most interesting in this valuable book. It will be sent anywhere upon receipt of price.

Trade Treatises.

"Crushers and Pulverizers," Trent Engineering & Machinery Co., Salt Lake City, Utah, No. 8; 8 1/2 x 11 paper, fifty-two pages. Detailed illustrated description of crushing and pulverizing machinery, with data, sectional and profile views.

Recently Declared Mining Dividends.

Bunker Hill & Sullivan M. & C. Co., \$9000.....July 5

Latest Market Reports.

SAN FRANCISCO, July 3, 1902

METALS.

SILVER.—Per oz., Troy: London, 24 1/2 (standard ounce, 925 fine); New York, bar silver, 52 1/2; refined (1000 fine); San Francisco, 52 1/2; Mexican dollars, 44 1/2; San Francisco, 42 1/2; New York.

Laredo, Texas, reports large daily shipments of pure silver in bars through that place from New Jersey to the Mexican Government Mint, City of Mexico. The average weight of the bars is seventy-five pounds. These ore shipments will pay no entrance duty. The Mexican Government some time since granted the American Smelting & Refining Co. the right to import 5,000,000 ounces of silver bullion that had been exported from Mexico. This bullion will be coined free of charge in the Government mints, and, under the ruling rate of exchange, will permit of a profit.

The annual coinage statement issued by the Director of the Mint shows that during the fiscal year ended June 30, 1902, the total coinage executed at the mints of the United States was \$94,526,687, as follows: Gold, \$61,980,572; silver, \$30,116,369; minor coins, \$2,429,736.

The net debt of the United States on June 1, 1902, was \$982,468,572, after deducting all the cash in the treasury.

COPPER.—New York: Standard, \$11.25@11.50; Lake, 1 to 3 casks, \$12.00; carload lots, \$12.25; Electrolytic, 1 to 3 casks, \$11.75; carload lots, \$11.50; Casting, 1 to 3 casks, \$11.75; carload lots, \$11.00. San Francisco: \$14.00. Mill copper plates, \$17.00; bars, 18@24c. London: £52 1s spot, per ton.

LEAD.—New York, \$4.12 1/2; Salt Lake City, \$3.60; St. Louis, \$4.00; San Francisco \$4.50, carload lots, 4 1/2c 1000 to 4000 lbs.; pipe 5 1/2, sheet 6, bar 5 1/2; pig, \$4.75. London: £11 2s 6d per ton.

SPELTER.—New York, \$4.87; St. Louis, \$4.50; London, £18 12s 6d per ton; San Francisco, ton lots, 6 1/2c; 100-lb lots, 6 1/2c.

ANTIMONY.—New York, Cookson's, 10c; Hallett's, 8 1/2c; San Francisco, 100-lb. lots, 10c; 300 to 500 lbs., 11c; 100-lb. lots, 13@15c.

TIN.—New York, pig, \$28.25; San Francisco, ton lots, 31 1/2c; 1000 lbs., 31 1/2c; 500 lbs., 31 1/2c; 200 lbs., 32c; less, 32 1/2c; bar tin, 3 1/2c, 37 1/2c.

PLATINUM.—San Francisco, crude, \$17.50 3/4 oz.; New York, \$19.50 per Troy oz.

QUICKSILVER.—New York, \$48.00 large lots; London, £8 15s; San Francisco, local, \$46.00 3/4 flask of 7 1/2 lbs.; Denver, \$50.00. Export, \$43.50.

BABBITT METAL.—San Francisco, No. 1, 10c.

ALUMINUM.—New York, No. 1, 99% pure ingots, 35c; No. 2, 90%, 30c to 35c.

SOLDER.—Half-and-half, 100-lb. lots, 20c; San Francisco, Plumbers', 100-lb. lots, 16c.

NICKEL.—New York, 50@60c 3/4 lb.

STRUCTURAL MATERIALS.

IRON.—Pittsburg, Bessemer pig, \$21.00; gray forge, \$20.50; San Francisco, har, 3c 3/4 lb., 3 1/2c in small quantities.

STEEL.—Bessemer hillels, Pittsburg, \$33 and \$34; open hearth hillels, \$35.00; San Francisco, bar, 7c to 12c per lb.

CHICAGO CURRENT QUOTATIONS.

Bessemer.....	\$22.50@23.00
Foundry Northern 1.....	21.50@23.00
Northern 2.....	21.00@22.50
Northern 3.....	20.50@22.00
Southern 1.....	20.65@22.65
Southern 2.....	20.15@22.15
Southern 3.....	19.65@21.65
Forge.....	19.15@20.65
Charcoal.....	23.00@23.50
Billets, Bessemer.....	33.00@34.00
Bars, iron.....	1.80@1.90
Bars, steel.....	1.75@1.85
Rails, standard.....	28.00@30.00
Rails, light.....	34.00@40.00
Plates, boiler.....	1.90@2.00
Tank.....	1.75@1.80
Sheets, 26 store.....	3.25@3.40
No. 27.....	3.35@3.50
No. 28.....	3.45@3.60
Angles.....	1.75@—
Beams.....	1.75@—
Tees.....	1.80@—
Zees.....	1.75@—
Channels.....	1.75@—
Steel melting scrap.....	18.00@19.00
No. 1 railroad wrought.....	21.00@22.00
No. 1 cast, net ton.....	15.00@15.50
Iron rails.....	24.00@25.00
Car wheels.....	20.00@21.00
Cast borings.....	9.00@10.00
Turnings.....	13.50@14.00

CEMENT.—Germania, \$2.65; K. B. & S., \$2.65; Hewmoor, \$2.50; Trowell, \$2.50 per bbl.

LIME.—Santa Cruz \$1.60; Roche Harbor, \$1.60 per bbl.

LUMBER.—(Retail): Pine, ordinary sizes, \$19.00@22.00; extra sizes higher; redwood, \$21.00@22.00; lath, 4 feet, \$4.00 @4.25; pickets, \$19.50; shingles, \$2.25 for No. 1 and \$2.00 for No. 2; shakes, \$13.50 for split and \$14.00 for sawed; rustic, \$26.00 @32.00.

GENERAL SUPPLIES.

NAILS.—Per keg (list prices): No. 20d to 60d, Wire, \$3.50; Cut, \$3.50; 10d to 16d, Wire, \$3.55; Cut, \$3.55; 8d, Wire, \$3.60; Cut, \$3.60; 6d and 7d, Wire, \$3.70; Cut, \$3.70; 4d and 5d, Wire, \$3.80; Cut, \$3.80; 3d, Wire, \$3.95; Cut, \$3.95; 2d, Wire, \$4.20; Cut, \$4.20. Special rates for carload lots.

POWDER.—F. O. B. San Francisco: No. 1, 70% nitro-glycerine, per lb., in carload lots, 15 1/2c; less than one ton, 17c. No. 1*, 60%, carload lots, 13 1/2c; less than one ton, 15c. No. 1** 50%, carload lots, 11 1/2c; less than one ton, 13c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2* 35%, carload lots, 9 1/2c; less than one ton, 11c. No. 2** 30% carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 728 kegs, \$1.50 per keg; less car lots, \$2 per keg.

CAPS.—3x, \$5.50 per 1000; 4x, \$6.50; 5x, \$8; Lion, \$9, in lots not less than 1000.

FUSE.—Triple tape, \$3.60 per 1000 feet; double tape, \$3.00; single tape, \$2.65; Hemp, \$2.10; Cement No. 2, \$3.00; Cement No. 1, \$2.65, in lots of 3000 feet and up.

CANDLES.—Granite 6s, 16 oz., 40s., 10c 3/4 set; 14 oz., 40s., 9c.

COAL.—San Francisco, coast, yard prices: Wellington, 88; Seattle, \$6.50; Coos Bay, \$5.50; Southfield, \$8.00. Cargo lots, Eastern and foreign: Wallsend, \$7.50; Brymbo, \$7.50; Pennsylvania, hd., \$14.00; Scotch, \$8; Cumberland, \$12; Cannel, \$11; Welsh Anthracite, \$14.00; Rock Springs, \$8.50, long ton; Colorado Anthracite, \$14.00. Coke, \$14 per ton in bulk, \$16 in sacks; Sunnyside, \$11.50, long ton.

CHEMICALS.—Cyanide of potassium, 98%-99%, jobbing, 27@28c 3/4 lb.; carloads, 25@26c; in 10-lb. tins, 38c; sulphuric acid, in carboys, 66 1/2c 3/4 lb.; soda ash, \$1.90 3/4 100 lbs.; hyposulphite of soda, 23@30c 3/4 lb.; blue vitriol, 5 1/2@6 1/2c 3/4 lb.; borax, concentrated, 7@8c 3/4 lb.; chlorate of potash, 12@13c; roll sulphur, 5c; alum, \$2.00@2.25; flour sulphur, French, 2 1/2@2 1/2c; California refined, 1 1/2@2c; nitric acid, in carboys, 80 3/4c 3/4 lb.; caustic soda, in drums, 3@4c 3/4 lb.; Cal. s. soda, bbls., \$1.25 @1.50 3/4 100 lbs.; sks., \$1.05; chloride of lime, spot, \$2.50@2.60; nitrate of potash, in bbls., 8c; caustic potash, 10c in 40-lb. tins.

OILS.—Linseed, boiled, bbl., 73c; cs., 78c; raw, bbl., 71c; cs., 76c; lots of 5 bbls., 1c less; Lucol oil, boiled, bbl., 64c; cs., 70c; raw, bbl., 62c; cs., 67c. Kerosene—Pearl, per gal., 20c; Astral, 20c; Star, 20c; Extra Star, 24c; Eocene, 25c; Elaine, 22c; Water White, in bulk, 13 1/2c; Mineral Seal, iron bbls., 19c; wooden bbls., 22 1/2c; cs., 25c; Mineral Sperm, cs., 26 1/2c; Deodorized Stove Gasoline, bulk, 16c; do., cs., 21 1/2c; 86° Gasoline, bulk, 20c; do., cs., 26 1/2c; 63° Naphtha or Benzine, deodorized, in bulk, per gal., 14 1/2c; do., in cs., 21c; Lard Oil, No. 1 bbl., 60c; cs., 65c; Neatsfoot Oil, bbl., 70c; cs., 75c; No. 1 bbl., 52 1/2@55c; cs., 57 1/2@60c; Sperm, crude, 60c; Natural White, 65c; Bleached do, 70c; Whale Oil, cs., 55c.

WHITE LEAD.—Per lb., in kegs: Five tons and over at one purchase, per lb., 6 1/2c; 1 ton and less than 5 tons, per lb., 6 3/4c; 500 lbs. and less than 1 ton, per lb., 7c; less than 500 lbs., per lb., 7 1/2c; in 25 lb. tin pails, 1c per lb. above keg price; in 1 and 5 lb. tin cans, 100 lbs. per case, 2 1/2c per lb. above keg price. Dry Lead—In bbls., 1 ton and over, 6c; do. in kegs, 6 1/2c.

RED LEAD AND LITHARGE.—One ton and over at one purchase, per lb., 7c; 500 lbs. and less than 1 ton, per lb., 7 1/2c; less than 500 lbs., 7 1/2c.

ASSAY LITHARGE.—Per lb., 8 1/2c.

BISMUTH.—Subnitrate, per lb., \$1.60.

BONE ASH.—4c 3/4 lb.

BORAX.—Crystal, 7c; calcined, 25c.

CHROMIUM.—(90% and over) per lb., \$1.25.

COPPER.—Carbonate, 20c; Red oxide, 3/4 lb., 60c.

MAGNESIUM.—Per lb., \$3.00.

MANGANESE.—(90% and over) 3/4 lb., \$1.25.

MERCURY.—Bichloride, 3/4 lb., 90c.

MOLYBDENUM.—25c 3/4 gramme; 1000 grammes=2 1/2 lbs.

PHOSPHORUS.—(American) 3/4 lb., 80c.

SILVER.—Chloride, 3/4 oz., 75c; nitrate, 55c.

SODIUM.—Metal, 3/4 lb., \$1.00.

URANIUM.—Oxide, 3/4 lb., \$3.50.

ZINC.—Metallic, chemically pure, 3/4 lb., 50c.

ZINC.—Dust, 3/4 lb., 10c.

ZINC.—Sulphate, 3/4 lb., .04c.

(These prices are wholesale, f. o. b. San Francisco, unless otherwise noted.)

New Patents.

DEWEY, STRONG & Co.'s SCIENTIFIC PRESS PATENT AGENCY, 330 Market St., S. F., has official reports of the following U. S. patents issued to Pacific coast inventors:

FOR WEEK ENDING JUNE 24, 1902.

703,037.—RAILROAD SWITCH—W. J. Bell, Los Angeles, Cal.
703,113.—BOTTLE STOPPER—H. A. Clark, S. F.
703,057.—INDICATOR—L. E. Graham, San Jose, Cal.
703,081.—THRESHER—C. W. Haines, Stockton, Cal.
703,343.—TRAIN ORDER BOX—L. G. Hogg, Los Angeles, Cal.
703,344.—MORTAR BED—J. M. Holloway, Santa Barbara, Cal.
703,931.—THRILL COUPLING—T. J. Huhbell, Los Angeles, Cal.
703,956.—SLICE BOX—F. M. Johnson, S. F.
703,280.—BICYCLE STAND—L. H. Knoche, San Jose, Cal.
703,132.—STELLAR COMPASS—R. T. Lawless, Alameda, Cal.
702,974.—LOG TURNER—W. L. Leland, Sisson, Cal.
703,147.—LETTER BOX—T. C. McLean, Seattle, Wash.
702,988.—CALENDAR—Florence M. Nace, S. F.
703,084.—ORE SEPARATOR—C. C. Pratt, Portland, Or.
703,337.—ROAD OILING MACHINE—T. F. White, Chino, Cal.
703,381.—WASHING MACHINE—J. Woerndt, Frances, Wash.

Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

ORE CONCENTRATOR.—No. 702,541. June 17, 1902. L. Cohen and J. Gross, Sombrerete, Mexico. This invention is an improvement upon ore concentrating tables and comprises two endless traveling belts or surfaces, one within the other, the inner one serving as a support for the outer or concentrator belt, and flexible bed sections upon which these belts are carried, and by which they are given a double incline, with means for varying the inclination of the belts.

HAND ROCK DRILL.—No. 702,499. June 17, 1902. V. Y. Smith, Oakland, Cal. In this invention is shown a device for drilling rocks and the like, and a mechanism including an impelling spring by means of which the drill is retracted against the action of the spring, means are provided for releasing it and allowing the spring to act, means for turning the drill between each forward movement, a lever and connected mechanism by the alternating movement of which the drill is retracted and released for each forward stroke.

BOTTLE STOPPER ATTACHMENT.—No. 703,113. June 24, 1902. H. A. Clark, San Francisco, Cal., one-half assigned to J. E. Daly of same place. Good assessor relates to an attachment for bottle stoppers of that class in which a stopper has a link passing through a hole in the rigid portion of the stopper and the ends of the link connected with a lever fulcrumed to the bottle by a wire or clamp surrounding the bottle neck, so that when the loop of the lever is pressed down against the neck of the bottle it acts through the link to draw the stopper downward and force the soft or flexible portion tightly into the bottle neck to form a closure, and when the lever is lifted up and turned about its fulcrum it releases the link and the stopper and allows the latter to be removed.

SITUATIONS WANTED.

WANTED.—Position by a technical graduate. Am an experienced stamp and cyanide millman, good assayer and chemist. U. S. deputy mineral surveyor. Can handle any kind of a mill or mine. Address Technical, care of this office.

ASSAYER, familiar with cyanide practice, desires position as assayer, or in some capacity, in cyanide plant. Address X, care of Mining and Scientific Press.

PHYSICIAN AND SURGEON with three years' experience in both emergency and general hospitals, in addition to experience in mines and private practice, wishes position in a mine. Best of references. Address Box 125, care of this office.

PRACTICAL MILLMAN.—AMALGAMATOR, Oxide Mill and Assayer, wishes position. School of Mines graduate. Best references. Address R. B., care of Mining and Scientific Press.

CHEMIST AND ASSAYER, WITH TWENTY years' experience in mill and smelter work. Can handle any kind of a mill or mine. Address A. C., care of Mining and Scientific Press.

MINING ENGINEER, practical miner and mill man, assayer, etc., desires position of superintendent or assistant manager of a big property. Eleven years' experience. Best references. Now working in southern California. Address A. M. P., care of Mining and Scientific Press.

Cyanide and Stamp Mill Superintendent open for engagement after September 1st. Graduate. A thorough assayer and chemist; also accountant. Speaks Spanish. Will go anywhere. Specialty, construction; also successful treatment of low-grade and slimy ores. References "A. I." Address Practical, care of Mining and Scientific Press.

WANTED.—SITUATION AFTER MARCH 15, 1903, as Manager or Superintendent of mine. Have had five years' experience in manufacturing and constructing mining machinery and plants. Three years' experience in underground work. Four years' experience as manager and superintendent. Treatment of low grade ores a specialty. Practical in every detail. State location of mine and salary. Best of references. Address X. Y. Z., this office.

A technically educated Mining Engineer, at present employed as superintendent of mines at one of the largest corporations in Mexico, desires a change of position to the United States about July 1st. Has had 18 years' successful experience as engineer and superintendent, never having made a failure; 36 years of age; strictly temperate; a skilled designer, geologist and metallurgist, and a practical miner, as well as a hard worker and thorough business man. References of the highest order, including present employers. Address Supt., care this office.

MINING AND SCIENTIFIC PRESS

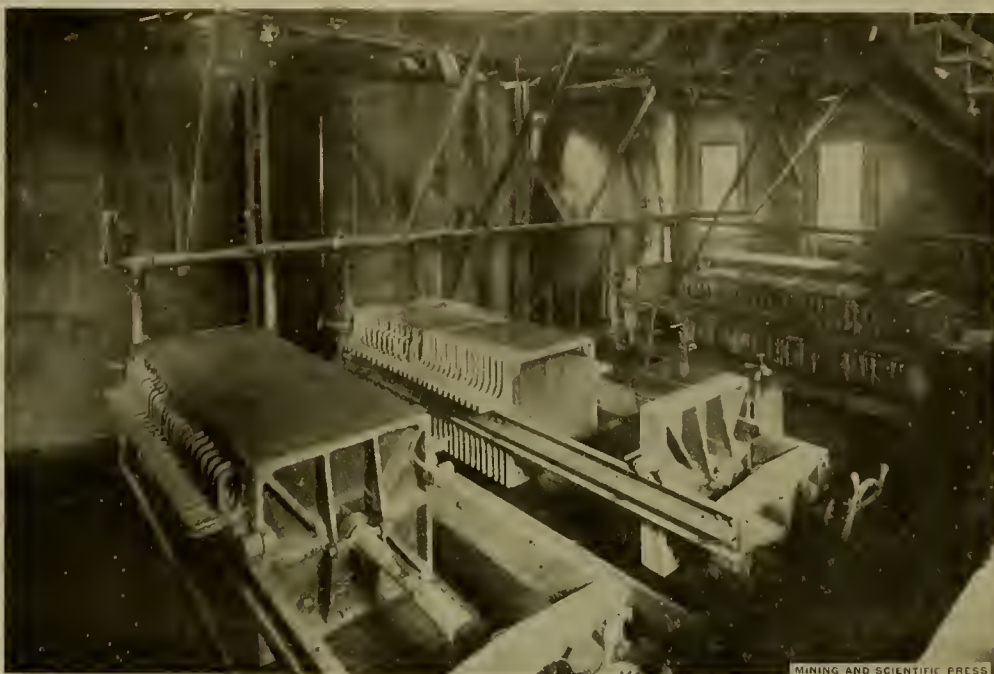
Whole No. 2190.—VOLUME LXXV.
Number 2.

SAN FRANCISCO, CAL., SATURDAY, JULY 12, 1902.

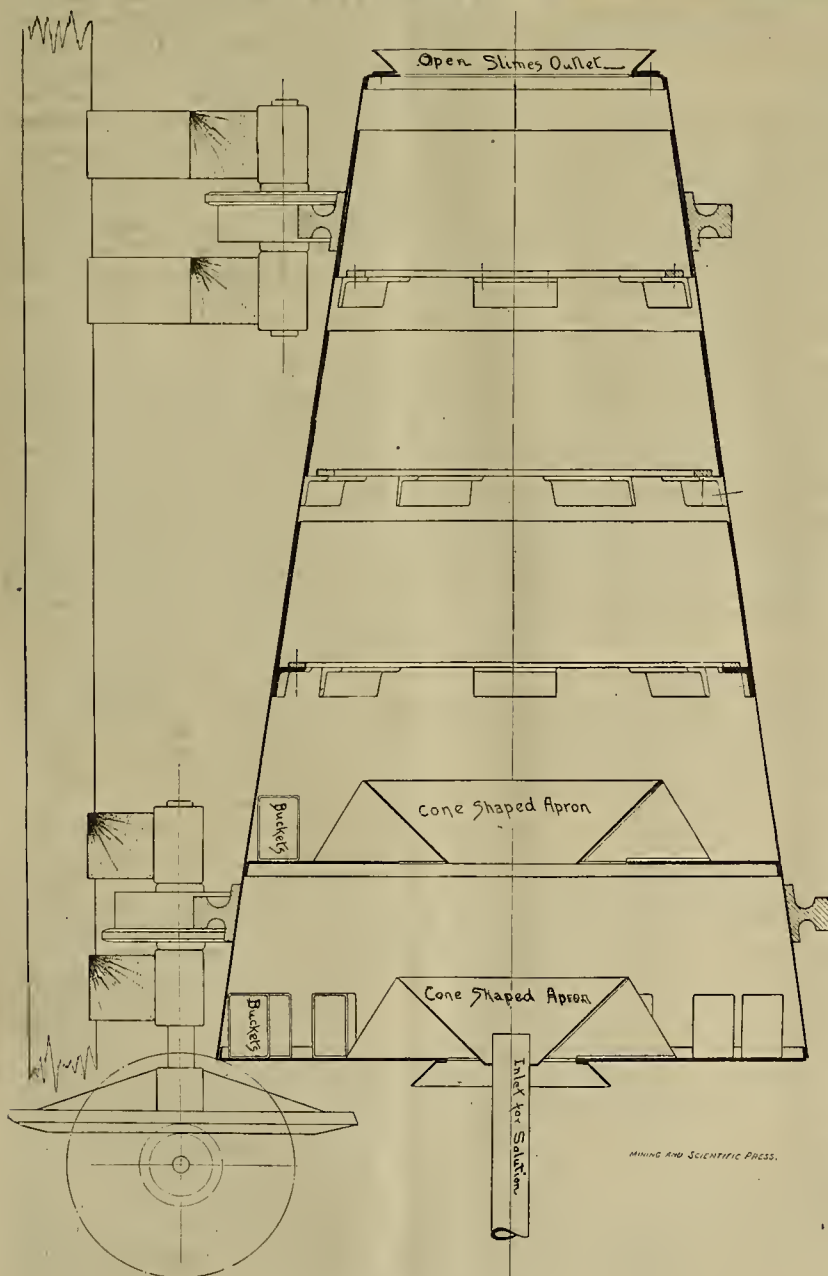
THREE DOLLARS PER ANNUM.
Single Copies, Ten Cents.

Treatment of Slimes.

At the Sunshine Mining Co.'s property, Sunshine, Utah, Manager Geo. Moore has a filter process in operation which is successfully solving the slime problem. The cyanide plant there is now treating 110 tons daily. In the filter process illustrated herewith the cyanide solution flows continuously through the 3-inch pipe, entering the separator at the right, while the ore is fed continuously through the open left end, as the separator revolves. As the ore passes down the incline shell of the separator it comes in contact with iron balls, which roll loosely in the machine, and by which action the sands are freed from the gold-bearing slimes, the latter being held in suspension and carried, with the solution, out of the open end at the left and discharged into agitation tanks, then into pressure tanks, from which they are forced by compressed air through the filter presses. In the meantime the gold-bearing sands are picked up by huckets at the lower end of the separator, lifted to the top of the machine and allowed to fall upon a cone-shaped apron, the small end of which projects through the opening at the end of the shell, thus causing the sands to be discharged from the apparatus and into the large sand-leaching tanks below. The principle of this separation is that owing to the fact that the circular opening at the large end



Filter Process, Sunshine, Utah.



Slime Separator, Sunshine, Utah.

of the device is of smaller diameter than that at the small end the slimes have a fall of 6 inches from the large to the small, and the sands having a fall in the opposite direction of 15%, due to the conical shape of the apparatus. The ores are brought up to this separator by an incline belt, which is fed automatically from the crushed ore bin.

In Kalgoorlie, Australia, at the Golden Horseshoe, Manager J. W. Sutherland also makes a commercial success of filter pressing, chiefly on oxidized ore. There are there nine filter presses in series of three. The hattery slimes, which pass through 150-mesh screen, after passing over spitzluten separators, are pumped direct into the presses, the clear water being returned to the hattery. When the presses are full, cyanide solutions are forced through the cakes at a high pressure, approximately 90 pounds per square inch, until all the available gold is extracted. It takes approximately ninety minutes to fill, ninety minutes to extract the gold, and the same time to empty the three presses, and the costs are approximately: Cyanide, 40 to 50 cents; air, 14 cents; discharging presses, 29 cents; dumping residues, 21 cents. The total cost, including repairs and renewals, assaying, zinc, and realizing hullion, etc., varies from \$1.80 to \$2.10 per ton on approximately 3500 tons per month. The Great Boulder mine at Kalgoorlie also has a number of filter presses, and has treated 9000 tons per month, total costs being about \$2.40 per ton, including repairs and renewals.

On the Kalgurli mine two filter presses are used. The slimes are driven into the presses with compressed air at a pressure of 40 pounds per square inch. The spent, or sump, cyanide solutions are then pumped through the cakes at a high pressure to wash the cakes, which are then dried by compressed air. The costs are: Filter pressing, including air, emptying and closing presses, repairs and renewals and dumping residues, etc., \$1.04 per ton; total cost from hydraulic separators to dump, including cyanide agitation and power, \$2.65 per ton.

It will be noted that in the last-mentioned Australian mine the filter pressing, without any grinding power, costs \$2.65 per ton, the average residues for the three months' data furnished herewith being 1.95 dwt. per ton. The total costs for treating the sands, including 13 cents per ton power, also air used for recirculating cyanide solutions, is \$1.08 per ton, the average residue for the three months reported being 2.43 dwts. gold per ton, or 48 cents worse than the filter press residues, while the filter pressing costs \$1.47 per ton more than the sands treatment. This shows in that case a balance of 99 cents per ton in favor of the sands treatment. It will thus be seen that in this mine, to recover the extra 48 cents' worth of gold left in the sand residues, would cost \$1.47, plus the cost of grinding.

QUESTIONS involving the legality and illegality of mining transactions constitute a large part of the queries weekly received, and while earnest effort is made to give correct answer, yet, obviously, where litigation is liable it were advisable to get competent legal advice thereon. The law is merely a collection of memoranda and precedent, and while this paper can correctly state exact fact in some departments of mining and metallurgy, the courts have so often reversed their own decisions that any information furnished inquirers is liable to revision from the same source that supplied the original dictum.

MINING AND SCIENTIFIC PRESS.

ESTABLISHED 1860.

Published Every Saturday at 330 Market St., San Francisco, Cal.
TELEPHONE, DAVIS 771.

ANNUAL SUBSCRIPTION:

United States, Mexico and Canada.....\$3 00
All Other Countries in the Postal Union.....5 00

Entered at the San Francisco Postoffice as second-class mail matter.

Chicago Office (Telephone, Harrison 73).....737 Monadnock Block.
Denver Office (Telephone, Olive 733).....606 Mack Block.

J. F. HALLORAN.....Publisher.

San Francisco, July 12, 1902.

TABLE OF CONTENTS.

ILLUSTRATIONS—Slime Separator, Sunshine, Utah; Filter Process, Sunshine, Utah, 17. Lime Stacker, Automatic Feeder and Measuring Device, and Conveyor-Mixer, Manufactured by Chisholm, Boyd & White Co.; Improved Briquetting Press, Manufactured by Chisholm, Boyd & White Co., 21. Mining and Metallurgical Patents, 25.

EDITORIAL.—Treatment of Slimes, 17. Amending the Mining Law, 18-19. Some Gold Nuggets, 19.

MINING SUMMARY.—26-27-28-29.

LATEST MARKET REPORTS.—15

MISCELLANEOUS.—Concentrates, 20. Briquetting: How It Is Done, 21. Malay Peninsula; Compressed Air for Pumping Oil Wells; Hoisting Works for Deep Mines; Electricity Direct From Coal, 22. The Kimble Drift Mine, El Dorado Co., Cal; Mexican Mining Notes, 23. New Business; Cyanide Assay for Copper; Liquid Fuel—Boiler Firing With Oil, 24. Mining and Metallurgical Patents; Consumption of Coke in Arizona, 25. Personal; Commercial Paragraphs; Recently Declared Mining Dividends, 29. New Patents; Notices of Recent Patents, 15.

Amending the Mining Law.

In the issue of the 14th ult. was brief editorial notice of the new mining law amendment introduced in the U. S. Senate by Senator Kearns of the State of Utah.

From all over this west half of America come requests for editorial opinion, coupled with vigorous argument for and against the measure.

This paper heartily favors Senator Kearns' amendment, and believes it would be better for the working miner than the present law. The author of the proposed amendment is himself a practical miner, has carried a tin dinnerpail and polished the head of a drill; by his efforts has attained a seat in the United States Senate, and has some clear ideas born of hard experience and long observation of this subject. He introduced the proposed amendment just before Congress adjourned, that metal miners everywhere might discuss it by the time Congress meets again. It is an important matter and merits full and free discussion. It is proper that every mining paper in the country should take up such proposed change in the Revised Statutes of the United States. It has been reported upon favorably by the United States Senate Committee on Mines and Mining, and will be either passed or defeated at the next session of Congress. Clearly, if miners show they want it, it will go through; if not, it will be turned down. The bill in full is as follows:

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled.

That Section 2322 of the Revised Statutes is hereby amended so as to read as follows:

SEC. 2322. Locators of mining locations hereafter made on any mineral vein, lode, ledge or mineral deposit situated on the public domain containing gold, silver, cinnabar, lead, tin, copper or other valuable deposits, their heirs or assigns, where no adverse claim exists at the passage of this Act, so long as they comply with the laws of the United States governing their possessory title, shall have the exclusive right of possession and enjoyment of all surface included in the lines of their location and of all veins, lodes, ledges and mineral deposits throughout their entire depth which lie within such surface lines extended downward vertically. Such location shall be in rectangular form and shall not exceed 1500 feet in length on either the end or side lines thereof; provided, that irregularly shaped claims may be located where previous locations render rectangular locations impracticable, but such claim shall not exceed in area a claim 1500 feet square. Every location hereafter made shall be distinctly marked on the ground, so that the same can be readily traced. Within 90 days from the date of location the locator shall cause the same to be surveyed and a plat thereof recorded in the office of the county recorder of the county in which the claim is situated. No person shall locate more than one claim in the same mining district. Provided, that he shall have the privilege of filing with the recorder of mining records in the district a notice of abandonment of a claim lo-

cated by him, and thereafter he shall have the right to locate another claim as fully as if no location had been made by him in said district. And the claim so abandoned shall be opened to relocation.

SEC. 2. That Section 2322 of the Revised Statutes, relating to tunnels, he and the same is hereby repealed.

SEC. 3. That all Acts and parts of Acts in conflict with the provisions of this Act are also repealed.

Section 1 cuts out all extralateral rights.

Section 2 cuts out tunnel and locator's rights to blind ledges discovered in a distance of 3000 feet from the mouth of his tunnel.

The miner is the only one to be considered. Whatever is best for him—that is the thing to do. If the present law, framed by Senator Wm. M. Stewart in 1872 (then and now United States Senator from Nevada), is satisfactory and right, retain it; if it works hardship and is irksome, or expensive, or demoralizing, repeal it, and pass Senator Kearns' amendment or something like it.

Other countries have tried the extralateral, apex law; they have all discarded it—except the United States and Bolivia. That, however, is no criterion. Every other mining country on earth (except Bolivia) may be mistaken, and to us, alone, of all the world, may be vouchsafed superior judgment. Still, it may be possible that the same degree of satisfaction and prosperity secured by the mining laws of other lands might be accorded the metal miners of this nation if the extralateral right were abrogated, and the simple surface right substituted.

Under the present system we have had thirty years of gigantic fraud, shameless blackmail, stupendous expense, and constant and cruel litigation. The mining industry of the country has prospered in spite of the country's mining law and not because of it. The extralateral law that Senator Kearns' amendment is designed to displace has cost more blood and treasure than all the foreign conflicts that this country has engaged in since 1876. Hence a change might be beneficial.

Effort to secure such change has been made ever since Senator Stewart's bill of 1872 became a law. Since 1879 frequent attempts have been made to pass some relief bill, but whenever such a measure got through the House of Representatives "Senatorial courtesy" strangled it in the Senate. Such effort, therefore, is not new; the subject is an old one.

In 1897 the representations on this subject made by this paper formed one of the potent factors in the formation of the Mining Congress which met in Denver and unanimously petitioned Congress for relief from the onerous burden entailed upon the mining industry by the infamous extralateral law. At each annual meeting of that body since, and at the annual meetings of such representative bodies as the California State Miners' Association, similar resolutions and petitions have been passed and sent to Congress praying for such relief. Doubtless at the coming meeting of the Mining Congress in Butte, Sept. 1, 1902, the resolutions of its predecessors at Denver, Salt Lake City, Milwaukee and Boise will be reiterated.

The matter long since passed beyond the domain of argument. Some change is made mandatory by the requirements of the situation. The past is so narrow; the horizon widens and the future grows broader and broader. It is intolerable that present conditions continue. As well try to compel a growing giant to wear the clothes of a ten-year-old.

Since 1872 this paper has patiently published hundreds of "decisions" on this extralateral feature, including several Supreme Court decisions, and nearly every time there is some new judicial interpretation. After thirty years of this kind of thing no one to-day can produce any decision of any court (not excepting the Supreme Court of the United States itself) that is not liable to be set aside, reversed or hacked down from. We have the authority of eminent law makers and officials—State and federal—for the assertion that the expense and loss occasioned by this extralateral right, now sought to be amended by Senator Kearns, is stupendous.

Section 2322, U. S. Revised Statutes, as interpreted and administered, has corrupted and debauched lawyers, judges, jurors and legislators, has sent thousands to suicides' graves, has wreaked ruin on thousands of others, and has deterred millions of

willing dollars from mining investment. In five years on the Comstock lode in Nevada the litigation compelled by this extralateral law cost in actual expenses, officially audited, \$9,000,000—one-fifth of the total product of Comstock mines engaged in the litigation, and vastly in excess of the amount of dividends those mines paid during that period.

There are things in this life, however, better than mere money; manhood and integrity can not be given commercial values; the "extralateral right" has cost more than tangible millions in the debauchery it has entailed.

To Senator Stewart's credit it must be said that even he realized the truth of this, and, seeing the dreadful mess in which his law had placed the mining situation, he proposed its repeal many years ago. Stalwart, sensitive and ever active in defense of his pet law as he was, yet on one occasion he proposed to end the Chollar-Potosi-Grass Valley litigation by defining the respective claims by surface boundaries. Our authority for this statement is Eliot Lord, Fourth Monograph, U. S. Geological Survey. "When the boundary lines were determined it was to be stipulated that planes should be drawn perpendicular to those lines, extending indefinitely downward, and that the mining operations of all companies should be confined within the limits of the planes bounding their respective claims. All pending suits should be adjusted as soon as possible, and, the main cause of litigation having been removed, he (Stewart) foresaw that the mining industry of the district would expand with natural vigor. Now, this was substantially a relinquishment of the cherished but litigious principle which allowed a locator to follow the dip of his ledge indefinitely."

The scheme was a sound one then, as now, but Senator Stewart abandoned it.

In 1878-9 Judge B. C. Whitman was the attorney of the great bonanza firm. In his testimony before the Government Land Commission (Oct. 11, 1879, page 421 of the report) he was asked his opinion of apex and surface locations. He said: "I think the square location would have no injurious effect upon deep mining. On the contrary, it would improve it. * * * A man could go in, then, feeling that he owned that piece of ground, and I think that every prospector would be willing to avail himself of that and go to work on that supposition. The history, so far as I know, of every mine and mining company is continued litigation and expense by adverse locations. With a square location there could be no litigation."

Seven years ago R. W. Raymond wrote: "The actual expense of litigations under this law has mounted into millions. The full development of the mineral resources of the West will never come to pass until the capital it requires is better protected by definiteness in title and boundaries of mining property. And that can not be done, in my judgment, by any amendment of the present law which shall leave in it the present abnormal, irregular, indefinable, precarious and mischievous extralateral right. * * * The system at present in vogue has fostered and will foster the most vexatious litigation."

Chief Justice Beatty says: "After a residence of seventeen years in the State of Nevada, with the best opportunities for observing, I can not recall a single instance in which the owners of really valuable mining ground have escaped expensive litigation, except by paying a heavy blackmail. * * * One man locates an honest claim in the evident apex of a true lode. Fifty or a hundred tramps locate claims all around him and over him. Not one of the tramps has discovered a lode; he has simply marked out a piece of ground and paid the recorder's fee. His claim is obviously valueless for working, but he is in a position to mine without the cost of muscle or plant. * * * The blackmailer's method is simple and effective * * * he has only to say, 'It will cost you less to pay than fight.'"

A public land commission specially organized for this whole matter and impartially made up some years ago got testimony from prospectors, mine owners, mining engineers, and mining men in general, secured expert evidence from practical miners in all this western country, and in their report to Congress said: "Your commission, after a review of the lines of mining contests and a consideration of the complex nature of ore deposits, are unanimous in the convict on that any attempt on the part of the

United States to convey such deposits as individual things beyond the vertical planes bounding the surface claim, must always end in a history of intolerable injustice. The result of our test of public opinion shows that, while there are regions whose simple fissure veins have not caused battles, and where, consequently, the people ask no change, the majority of experienced mining men desire a change from the lode location, with its disastrous sequel, back to the security and peace of the solid old common-law doctrine. The present law might be fitly entitled: "An Act to cause the Government to join, upon unknown terms, with an unknown second party, to convey to a third party an illusory title to an indefinite thing, and encourage the subsequent robbery thereof."

This is not cited as ancient history, but to show how hundreds of picked men who have given great thought and intelligent study to this thing, view the matter. Did space permit we could quote columns of caustic exhortation of the fraud that has so long been foisted on American miners. The thing is a horrible mess, and the more it is stirred up the worse it smells. Any one who will take the trouble to go into an investigation of this subject will probably come to the same conclusion. Thousands of our readers will doubtless recall some bitter bit of disastrous experience entailed by the existence of this law that Senator Kearns' amendment seeks to set aside.

There are always fifty little suits and one big one being tried involving this question. It is a profitable industry for mining lawyers and experts, but hard on the working miners who have to pay the millions of costs that this expensive foolery entails, and which would be stopped by the passage of a bill repealing the extralateral right. A case in point occurs as these words are being written in the present fight between the Bunker Hill & Sullivan and the Empire State-Idaho companies in an extralateral right case now on trial in the federal court. The suit is the result of the usual extralateral tangle, this time over the ownership of a silver-lead lode at Wardner, Idaho. It affects the ownership of claims along the whole length of the ledge. The local paper says, "It is so strangely involved that the ablest mining engineers in the country are puzzled over the facts, while the questions of law involved will probably take the case up to the Supreme Court of the United States."

This particular extralateral case hinges upon the peculiar manner in which the claim was staked nearly twenty years ago. The outcrop was so large that the prospectors were unable to discover the strike of the vein, but they staked a claim, the Bunker Hill, with its general course east and west. Subsequently it was found that the vein runs northwest and southeast, and its foot wall traverses the side lines diagonally. The ledge is from 200 to 1000 feet wide, and the course of its hanging wall is a problem that is at the root of the present litigation. The Bunker Hill Company claims that the hanging wall as well as the foot wall, passes through the two side lines, and thus the whole vein actually extends through the side lines instead of through the end lines as is usually the case. The Empire State-Idaho people concede that the foot wall passes through the side lines, but maintain that the hanging wall enters the claim on the south side line and leaves it through the west end line.

Under the decision of the United States Supreme Court in the Flagstaff case, a mining claim can be worked extralaterally within the planes of its side lines, extended, if the lode passes through the side lines, instead of through the end lines of the claim. The Bunker Hill Company asserts that such a condition exists in this case, and that therefore they have extralateral rights on the lode past the west end line, within the planes of the side lines, extended. The Empire State-Idaho Company claims that the hanging wall passes through the side line and an end line, and argue that the vein can not be properly said to traverse the claim through the side lines, and that the Flagstaff ruling does not apply. The Empire State-Idaho Company asserts that the Bunker Hill should take extralateral rights within the extension of its end lines, which would compel it to work southward instead of westward down into the ledge outside the limits of its surface. Then to make matters still more mixed up the Empire State-Idaho Com-

pany claims that the ledge instead of running approximately in an air line, really forms an arc, and that after passing out of the Bunker Hill ground northwestward, it travels in the segment of a circle until it comes into the Corrigan ground four miles from the Bunker Hill and due west of that claim, the lode forming a scoop underground. The extension of the Bunker Hill's extralateral rights through its west end line would then give it title to a part of the vein about 600 feet wide, extending down into the ground until it should turn upward again to form a new apex in the Corrigan ground. In the various claims on the segment of the circle between the Bunker Hill and the Corrigan there is room for unlimited litigation unless the ownership of the ore body in dispute shall be definitely settled.

Then comes the Last Chance claim, northwest of the Bunker Hill, and owned by the Empire State-Idaho. If the Bunker Hill should be the winner in the present litigation it will cut the Last Chance out of a large share of the ore body. If the Empire State-Idaho wins, the Last Chance will get much of the ore, and other portions of the vein will be left in further dispute as to ownership.

This is understated if anything. It forms a present example of how mine development is hampered and held back, for such costly performances deter capitalists and reduce dividends.

Bad roads, bad management, inexperience, the arrogance of ignorance, and other hindrances, hurt the mining industry, but all the drawbacks that could be enumerated, put together, are not as hurtful to the development of this west half of America as Section 2322, U. S. R. S., which is a relic of the silurian age, and has no place in twentieth century mining progress.

This paper is always willing to concede to other the same degree of consistency it claims for itself. Doubtless there are many who will honestly disagree with its belief, and will hold that the present law is all right and should not be disturbed. They have a right to be wrong if they want to, but the plain fact is that the extralateral law hinders mining development and bears the hardest on the working miner and on the men who put up money for mine development. And these are the very men that need protection, or at any rate, a fair show. No miner wants any favor; that isn't figured on anywhere by a real miner, but he does want and ought to have a free field for the successful exercise of his efforts, and a fighting chance to win.

Of course men who don't know that gold comes out of the ground in the crude state; men who think that the \$20 gold pieces come just as they are from the big gold mines, and the \$10 gold pieces from smaller ones, and the \$5 gold pieces from little mines; men who mine with their mouths and who don't know any more about real mining than mining knows about them, may say: "Why should we be wiser than our fathers? Go to!" But the real miners, the men who have developed the mines of this western country, know well the needs of the hour, and are proud to see one of their number, a miner like themselves, stand up in the Senate of the United States and speak for the industry that sent him there. Any one who has followed the course of litigation caused by the United States statute in question will see that nearly all those big suits ended by some stipulation or agreement defining the rights of both parties without reference to the "law," or else by buying out the weaker party.

"Might means right" has too long been the working motto for mine litigation. Let the incentive to such injustice close by proper amendment to United States revised statute 2322. Such action is a present necessity and in the interests of the miner.

Meanwhile this subject is deserving of discussion now just as much as ever. Nothing is ever settled until it is settled right, and by the time Congress meets again there ought to be a general consensus of opinion on this matter.

THE time has about arrived where the chemist is as important in mining as the geologist. Chemical geology, like electro-chemistry, is a branch of organized knowledge that will have intimate connection with the commercial side of mining and metallurgy. The chemical constitution of ore bodies as such furnishes an interesting and suggestive field of action

FLAT wire hoisting rope in constant use is all the for being tarred once a week, the cage being repeated to the collar of the shaft and slowly lowered, the hot tar is applied in a thin layer by one man on each side of the rope. The mixture is made of one barrel of pure tar to twenty gallons of beef tallow.

ADAPT the process to the ores, not the ores to the process. "Our ores are refractory" one hears less frequently than ten years ago. Few so expressing themselves have any knowledge of metallurgy. In the gold the ores do not contain a base but that can be eliminated by processes and methods that are generally in use.

IN one of the mills of the Alaska-Treadwell Co., Douglas Island, Alaska, containing 240 stamps, they were operated 312 4 days of twenty-four hours each in one year; number of shoes worn out was 501; number of dies worn out, 570; stems broken and replaced, 150; new cams in, 20; new cam shafts, 6; mortars broken, 7. The quantity of ore crushed in the mill was 225,272 tons, averaging 3.01 tons per stamp per day.

AMERICA leads in the world's supply of the two metals foremost in the electrical field, copper being the positive metal and zinc the negative; but, though only a positive metal, no substitute for the latter has yet been found. The smelting of zinc is expensive, a large amount of coal being usually required to smelt it, this being usually done by vaporizing the ore and then condensing; there are few ores so volatile. The world's production of zinc is estimated at about 500,000 tons of which this country produces 300,000 tons.

THE earth is 8000 miles in diameter and except for a thin shell is probably hotter than any furnace yet devised by human skill. Estimates differ as to the thickness of this crust. Temperature increases with descent. Mines and oil wells at an average of 1° for every 50 ft. Assuming that the mean for the earth's surface is 59° F., the boiling point of water, 212° F., would be reached at a depth of about 8000 feet. Between 30 and 60 feet down the heat is sufficient to melt the hardest known substances. At that distance a temperature of 400° F. probably exists.

A DIRECT-ACTING engine is one in which the reciprocating parts, viz: the piston, crosshead and connecting rod, operate in a straight line between the cylinder and crank, as in the ordinary horizontal stationary engine, without intervening rocker shafts or any multiplying or reducing mechanism. When the shaft is located at one end of the cylinder and the crossheads and guides at the other, it is called an indirect-acting engine, sometimes styled a hack-action engine. A single-acting engine is one in which steam is admitted at one end of the cylinder, and on one side of the piston only. Thus the piston only receives one impulse during each revolution.

A GOOD and economical boiler is well constructed of the best materials, adapted to its work and of a capacity that meets the requirements, so set as to be economical of fuel and have proper facilities for the water to circulate in it. The space between tubes should be about one-half the diameter of each tube, for when they are much closer, or so set as to materially impede the circulation of the water, the best results cannot be attained. The boiler should be easy to clean and keep in repair, and so braced, bolted and set that it will stand all the sudden shocks and changes of temperature and pressure to which it is subjected without injuring its connections or foundations. As heat expands and enlarges the whole structure, the boiler should be so set that all parts of the brick work may be equally subjected to it, and the change made as uniform as possible in every direction.

UNEQUAL expansion and contraction in the parts of a boiler are severe tests of the strength of the material used in its construction. The larger the heating surface the greater the effect of the expansion and contraction, and for boilers set more than one-half exposed to the atmosphere great danger is liable to occur if they are not slowly heated and cautiously handled. The danger from these changes is much greater than that from the pressure of the steam, and the leakage and ruptures that so often occur near the bottom of horizontal boilers are generally traced to this cause. Too rapid firing is often to blame for leakage and injury to boiler heads. Suddenly heating the flues causes them to expand more rapidly than the shell expands, and when most of the tubes are placed near the bottom of the boiler, the expansion causes unequal strain on the boiler heads, which is occasionally sufficient to produce rupture of the plates, and at least cause dangerous leaks that are difficult to remedy.

THE mountain chains which now constitute the topographic limits of the Pacific coast downfold are composed of links that differ in age and composition. Although nearly in line, the Sierra Nevada and Cascade ranges are distinct. The Sierra Nevada is composed chiefly of three masses of rocks: sedimentary and igneous rocks of various ages from Silurian to Juratrias, which have been profoundly altered and have developed a schistose structure; large masses of granite intruded into later than the preceding, and lavas which have erupted through and flowed out upon the other rocks. The principal deposits of gold occur in the first-mentioned series and in gravels derived from it. The northern continuation of the Sierra Nevada uplift is represented geologically in the Blue mountains of Oregon, the rocks of the two being similar. The Cascade range is younger and is wholly of volcanic origin, from Lassen Peak, Cal., to the south to Mount Rainier, Wash., on the north. It

is a pile of lavas which have flowed from hundreds of vents. From a few of these vents eruptions have been repeated so often and during so long an epoch as to build up the volcanic cones of which Shasta, Hood and Rainier are examples. Northward from Rainier the Cascade range resembles the Sierra Nevada in composition.

COMMERCIAL STORAGE BATTERIES are usually made with lead plates immersed in dilute sulphuric acid. The chemical action which goes on in these when current is being passed through the cell or used from it roughly consists in transferring oxygen, which exists in oxide of lead, from one plate to the other. The plates are generally arranged in such a manner that they will contain a great amount of oxide of lead. This is frequently accomplished by perforating the plates and filling the perforations with a paste which consists of lead oxide moistened with sulphuric acid. In preparing dilute sulphuric acid always pour the acid into the water, never the water into the acid. Lack of charging if continued long enough will result in sulphate forming on the plates which is indicated by white patches. In this condition no time should be lost in applying the charging current and allowing it to continue, after the cells are apparently fully charged, at about half rate until the sulphate entirely disappears. Always add pure water to the solution to make up for loss of evaporation, which, however, should not be added in large enough quantities to reduce the specific gravity to any considerable extent. The solution should never be allowed to get below the top of the plates.

A ROUGH AND READY ORE TEST, when an assayer is not available, may be made as follows: Take a sample of from ten to twenty pounds—the more the better. Select it without discrimination, so as to obtain a sample of the average character of the material of the vein where the sample is taken. Crush all the ore to about the size of walnuts and from this lot, by quartering down, take a sample of about three pounds. Pulverize this sample so as to pass it through a 40-mesh sieve. From this, by further quartering, select a sample of one pound to be tested as follows: Weigh out the sample (one pound), then work it down carefully in the batea, or pan—preferably the batea—until most of the sands have been washed off. Then add a few drops of quicksilver, which bring in contact with the gold by rubbing it throughout the pulp. Collect the small amalgam and boil it slowly in nitric acid, in a test tube, until the quicksilver disappears. The application of heat (of an alcohol lamp) hastens the process by dissolving the quicksilver. Pour out the acid carefully and wash out with water all traces of acid left in the test tube, then pour the gold carefully into an annealing cup and heat over the alcohol lamp until the gold is thoroughly dry, and then weigh it. This gives the amount of free gold per pound of ore, from which the free gold per ton may be readily calculated. An approximation of the fineness of the gold can be made by the eye sufficiently accurate for the test. Instead of cutting the amalgam by the use of nitric acid, the quicksilver may be volatilized by the blowpipe. The tailings from this sample should be saved and the sulphurets collected by washing off the sands. Then weigh the sulphurets, and from this weigh the percentage contained in the ore as ascertained by the assay or test made to determine the value per ton. A few vials, with carefully weighed amounts of gold, will be found useful for comparison with the pannings made upon the field. Such measures materially improve the guesswork otherwise practiced.

MINING had no sooner begun in California than it became apparent that water would have to be used, and that there must be some sort of "right," more or less permanent, to take and hold it. There were local mining laws at first that governed this. The miners first there found themselves without law, and every mining camp had to make its own laws; although these were scattered over hundreds of miles, they were nearly the same all over the State, the water right laws included, showing that the American left untrammelled by technicalities will get things about right. These mining regulations soon found themselves in the statutes of the State. Under this law a man or a company could post a notice at the point on a stream where he proposed to take out the water, stating how much water it was intended to divert and for what purpose. The appropriator then had to show bona fides by beginning work in a given time and had to prosecute it continuously to completion. Water so taken up and appropriated could be used by the appropriator or could be sold. The miners found but little difficulty in applying the law. When, however, water was "taken up" for irrigation purposes the question of riparian rights—the right to look at all the water in a stream on whose banks he owned land, flow past him unpolluted and undiminished in quantity—became the leading issue. The constitution of the State had provided that the common law of England should be the rule of action for the courts and the courts held strictly to it. No one could take water out of a stream for irrigation and return it all back again. Millions of dollars were spent in this litigation, and it ran through years of time. Of course, from small streams, where there were no riparian owners below the appropriators, and from reservoirs, irrigation went on uninterruptedly under this plan—no law was in such cases needed. In many cases the law of the shotgun prevailed, and, for that matter, the law of the shotgun, outside the district law, now almost entirely inoperative, is the only law California has for taking water out of a stream on which there are contesting riparian owners.

Briquetting: How It Is Done.

Written for the MINING AND SCIENTIFIC PRESS.

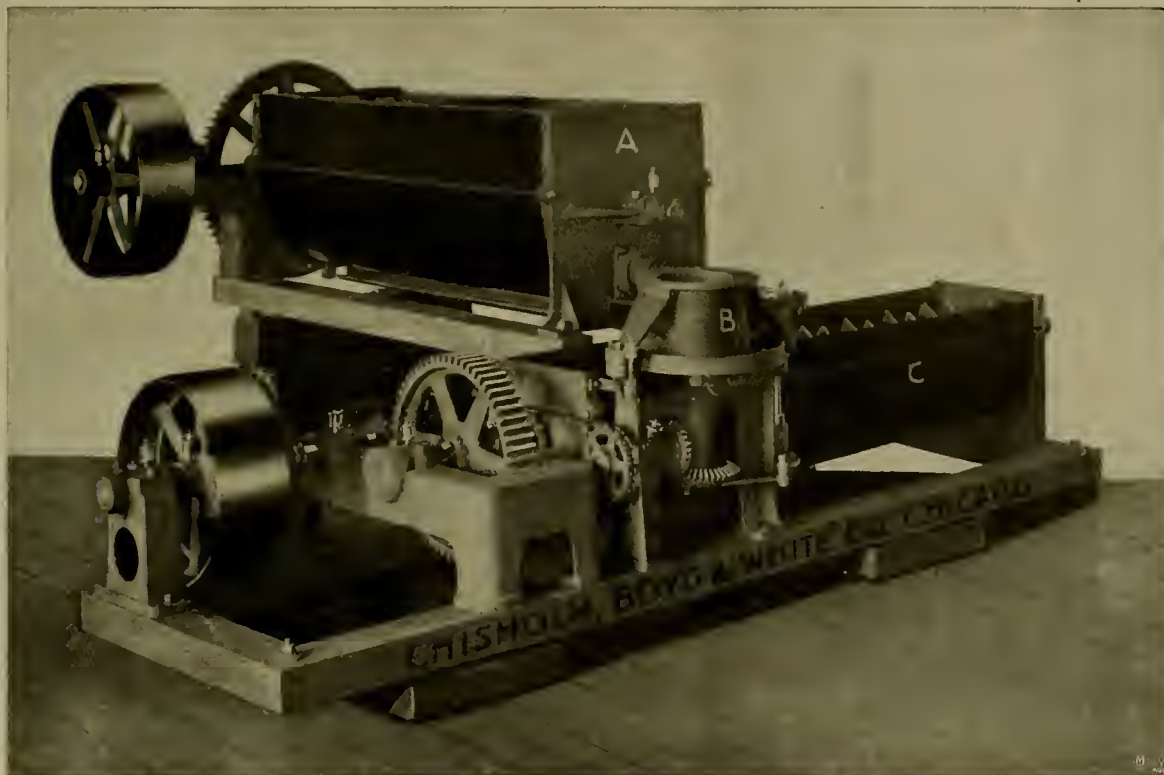
This subject is discussed by prominent managers and general superintendents of blast furnaces, silver, lead and copper smelters, as well as by the owners of coal mines and coke ovens. Some briquetting ma-

accomplished by heavy rollers running over the material on a circular track. The material, being alternately plowed and rolled, becomes plastic, resembling stiff clay, and in this condition is pressed into molds which are located in the track of the rollers. After the briquettes are formed in the molds they are further densified by a heavy pressure applied by a set

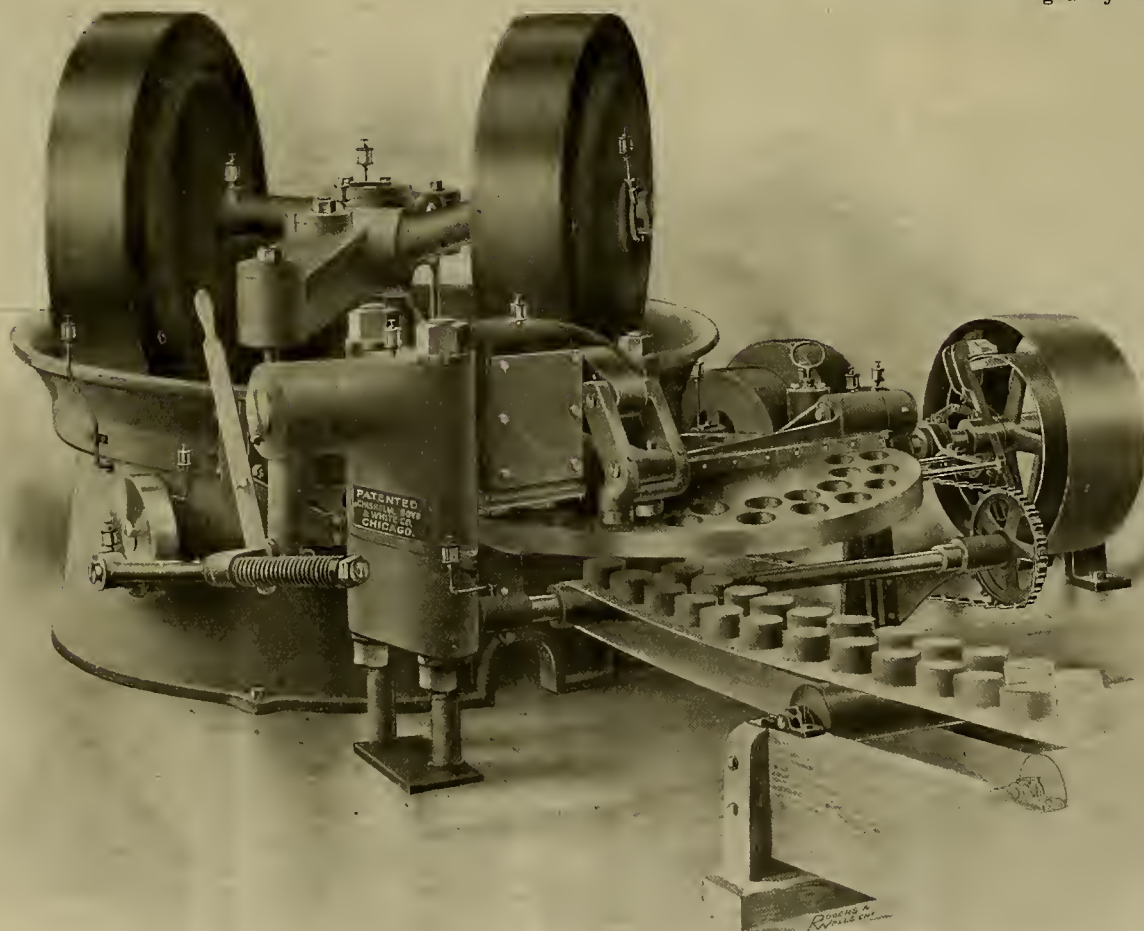
heated by waste gases from hot stoves or boiler stacks. This heat ranges from 210° to 330° F. When the ovens are properly arranged the heat is received under each car and taken away into flues through openings placed directly over each car. With this method the briquettes dry usually in from six to twelve hours. They are then strong enough to stand the rough handling incident to the automatic charging devices used in blast furnaces.

A desirable bonding agent for this class of work is 6% to 10% of thoroughly slacked and aged lime. Lime is improved in strength and plasticity when slacked and allowed to stand covered with water in settling tanks. A method has been devised to insure proper slacking of the lime in which rotary slackers are used. The lime is drawn from the slacker, through screens, into the settling tanks. When ready to use, the surface water is drawn off and the thick lime putty is taken to a horizontal tank in which are arranged revolving blades, which keep the lime from settling. When thus agitated the lime is readily pumped into a conveyor mixer, into which the fines are being fed.

When the material to be briquetted carries sufficient moisture dry lime, powdered, is used as a bond instead of cream of lime, the moisture in the mixture being sufficient for slacking the lime. Apparatus has been produced for producing pulverized calcium oxide of lime, dry and free from impurities. The amount of lime and ore fed into the mixer is regulated by adjustable automatic measuring devices. The conveyor mixer is built like a pug mill, having revolving blades attached to a center shaft at an angle of 30°, spaced 3 inches apart. Each blade is independent and can be removed and replaced without interfering with the others. From the conveyor mixer the material descends by gravity to the press. Thirty-five



Lime Slacker, Automatic Feeder and Measuring Device, and Conveyor-Mixer, Manufactured by Chisholm, Boyd & White Co.



Improved Briquetting Press, Manufactured by Chisholm, Boyd & White Co.

chines are built on the principle that heavy pressure only is necessary to make perfect briquettes. Others have been working on the lines of a thorough kneading and mixing of the bonding agent with the material to be briquetted. That method is by some deemed best in which perfect mixing and incorporating of the bonding agent with the material to be briquetted is the main feature. This mixing is

plungers operated by a toggle and lever mechanism. The briquettes are next ejected from the molds, deposited on a belt conveyor arranged to deliver them either into storage cars or trays, and then delivered by rail to the charging floor or bins convenient thereto. Where the storage capacity is limited, or where it is desired to hasten the drying of the briquettes, they are passed through drying ovens, which can be

horse power is required to drive the press and the auxiliary machinery.

The field for briquetting is large. Engineers have successfully treated many kinds of fine materials—coke and charcoal breeze, bituminous and anthracite coal fines, concentrated iron, copper and lead ores, mattes, roasted ore, flue dust, purple ore, bauxite, manganese and slimes from concentrators and elec-

trolytic vats. With silver-lead ores it is asserted that a saving in blast pressure of nearly one-half could be made by crushing and bedding all the ores, together with the flux and the coke breeze that collect around the plant, and briquetting the entire charge. Thus there is a saving in steam power and of the heretofore wasted coke.

The size and shape of the briquettes, which are either 4 or 3 inches in diameter and 2½ inches thick, allow the gases to freely pass through the charge, eliminating the tendency to hang and scaffold. The actual increase in furnace capacity, with briquettes charged instead of fine ore, is usually 10% to 15%.

The cost of briquetting, including all labor, power, bonding agent, oil, waste and repairs, is stated to be from 50 to 80 cents per ton of briquettes—dependent upon the location of the plant, cost and percentage of bond used, and cost of fuel and labor. While lime has proven to be the best bond under ordinary conditions, being beneficial to the furnace burden, other bonds are available where lime would be detrimental to the results desired. Dextrine, or molasses waste, or a combination of both, have proven satisfactory and inexpensive. Anthracite or bituminous coal dust, coke breeze, or a combination of these substances, when properly treated with the above bonds, make a briquette that is almost as strong as the original substance and gives similar calorific value, with the additional value of burning almost smokeless. Machinery is designed to handle either large or small quantities, so the proposition is within reach of any one having waste product to be treated.

Furnace managers and smelting machinery builders have often tried to solve the proposition of handling the fine ores and waste. None have been altogether successful, and some are now turning their attention to briquetting. Seventy plants are in operation in this country, two-thirds of which are for this special purpose. Full charges of briquettes, with lime bond properly incorporated and hardened, have been carried in both lead and iron blast furnaces, and experiments have shown that they do not decrepitate under pressure of the blast and the influence of the gases.

The Chisholm, Boyd & White Co. of Chicago, Ill., are manufacturers of a line of briquetting machinery which they claim embodies the processes essential to satisfactory and profitable briquetting. They are prepared to install plants arranged for handling any material, and will submit designs for the construction of plants which they guarantee to produce satisfactory results at initial cost and operating expense.

Malay Peninsula.

The lower half of the Malay Peninsula consists of the States of Perak, Selangor, Pahang, Negri, Semillan and Johore. The first four are known as the Federated Malay States—which are under the protection of Great Britain—and Johore will probably enter the Federation. To the north of these are numerous other Malay States, unexplored as yet, nominally under Siamese influence, but closed to European exploitation. The Federated Malay States, especially Perak and Selangor, contain far the largest and richest tin mining fields known. They supply at present about four-sevenths of the world's output of tin. These tin deposits stretch from the north, through the independent Malay States, into Siam, and the province of Yunnan, in China, and south into Sumatra, Banca, Billiton and other of the Dutch Indies.

A rough estimate of the world's present yearly supply of tin may be stated as follows:

	Per Annum. Tons.
Federated Malay States.....	45,000
Independent Malay States, Siam and Yunnan....	4,000
Dutch Indies.....	15,000
Australia and Tasmania.....	3,000
Bolivia and Peru.....	4,000
Cornwall.....	4,000
Total.....	75,000

Compressed Air for Pumping Oil Wells.

At Bakersfield, Cal., compressed air is in successful use for pumping oil wells. The air is piped from the air compressor to the well, a 1-inch pipe run down into the well and connected with a ¾-inch tubing near the bottom by a U-joint, though in some cases two or three pipes are connected, one at the bottom of the tubing, one at about three-quarters distance down and one about one-half the distance. In starting the well pumping they are all turned on together until the column of oil is started, when the intermediate connections are shut off and the lower one will do all the work, usually requiring about 120 pounds pressure in an 850-foot well, 14 gravity oil. By this method everything above the connections is carried out of the tubing and the deeper they are submerged the better the results. In this way the sand, which has been the source of so much trouble, is not allowed to accumulate, but is carried out with the oil, and, by gradually lowering the tubing, the well is cleared of whatever sand may have accumulated in it.

Hoisting Works for Deep Mines.

NUMBER III.

H. W. Hughes thought that many difficulties which were raised by the author of the paper were more imaginary than real. The problem was to get a rope maker to make them a light rope strong enough, and if it were possible to make a taper rope of equal excellence so far as constructive merit was concerned, and to work for the same length of time as a cylindrical rope, possibly the taper rope might be the best. The chief points seemed to him to have a rope as light as possible, and a drum as light as possible, and a steam pressure as high as possible. Steam pressure was going up, and so was the breaking strain of wire ropes, and the tensile strength of steel, which made it possible to use a lighter rope, a larger drum which did not weigh any more than the smaller drums of a few years ago and small cylinder engines running at high piston speeds, so that if they could wind from every known depth at the present time and from every such depth which would be likely to arise in the near future they had developed enough ground to last them for another generation. It did not appear to be worth while hothering themselves as to whether they might have to go to some problematical depth, when, by the time it was reached, the steam pressure and tensile strengths of steel would have increased to such an extent that the engineers of those days would be just as easily able to produce the necessary machinery to wind from such depths as they were at the present time. Personally he thought that two-stage windings from any reasonable depth—and he used the word "reasonable" as applying to such depths as 6000 feet—was quite out of the question from an economical point of view. It was not a question of designing the most theoretically perfect winding engine, but it was a question of making that winding engine get as much stuff out of the mine in the shortest possible time. By doing so they reduced the cost of labor per ton for every additional ton they raised above the normal, and they could only get large quantities by winding at an exceedingly rapid speed. The great time wasted by a winding engine was in starting the load. Everybody who was practically connected with mines knew perfectly well that there was a point in the shaft where, theoretically, it was advisable to shut off the steam and allow the engines to gradually come to rest, but he doubted whether there was any one mine in existence where steam was shut off at that theoretical place. The engineer went on as far as he dared, and then put on his brakes, the object being to keep up the speed as long as possible, for he could only make the average speed by obtaining at some part of the wind a very large maximum speed. He had not had time to thoroughly read the whole of the paper, but he certainly thought that Mr. Behr had in his calculations put at a very low estimate the maximum speed which could be obtained in the shaft. There were a very large number of instances in which a speed of 55 feet a second was commonly attained, and, if they could get at that speed safely in a shaft 3000 feet deep, why should they not get it up or exceed it in a shaft 6000 feet deep? Personally the problem seemed to be entirely, as far as he could judge of it at present, one for the rope makers and not for the engines. Ropes must be made lighter and stronger. There was certainly no depth which they knew of that the mechanical engineer could not design the winding engines for.

E. P. Rathbone said he would like to emphasize again his objections to the two-stage system mechanism of ventilation. After what the last speakers had said with regard to direct winding, and considering what they had been taught as colliery engineers, it seemed to him of the first importance at those great depths, with the increased temperature that might eventually be found in the deep levels of the Rand, that they should not go and put down shafts of this two-stage type, as if they did they might find that their construction would so prevent ventilation that they would find it a very great drawback indeed. That was an extremely serious point, and more serious than was apparent at the first sight of things. When they thought of the very great care that was taken with circular shafts to reduce the question of resistance of the air current in the collieries, they might also have to come to forced ventilation and fans on the Rand, and practically adopt what had been done in colliery work, and considering that the direct winding could be done, and there were no great objections mechanically, then they must take into consideration the question of ventilation, which was one of very great importance indeed.

Dr. Simon said that the ropes had gradually from the first time of winding decreased in size, and it had been pointed out that they would disappear altogether. This seemed a very tall statement to make, but if the present enterprise of bringing a railway to the top of the Jungfrau, the last stage of which was through a vertical tunnel, wherein, he understood, a cage would be moved by compressed air, were successful, a proof would be given that compressed air certainly would be the means of overcoming any depths, and they had not to take into consideration the rope maker any more.

Dr. Le Neve Foster said, with reference to the remark of the last speaker, that the pneumatic method

of hoisting was not in nubibus, but one which had actually been used in practice. Many of the members were doubtless aware that M. Blanchett many years ago had introduced his system of hoisting without any rope at a colliery at Epinac, in France, and that it had worked regularly for some time. Mr. Blanchett's apparatus was simply a piston in a big pipe, which was sucked up the shaft with a cage hanging to it. The cage carried nine wagons, and each wagon carried half a ton in it. Therefore it had been settled practically that they could hoist minerals from any depth without a rope. The method was given up at Epinac, not because it failed to act practically, for coal was brought up and men were regularly lowered and raised by the apparatus, but because the coal failed—there was not a sufficient amount of coal. Blanchett's system was described in the late seventies by various authors, and full details of this method of raising mineral or raising men could be found in various technical transactions. He was surprised to find that no mention had been made of the traversing drum in use at the Dolcoath mine, Cornwall. It is a traversing drum 20 feet in length, 10 feet only in diameter, and with each wind the drum was shifted laterally the diameter of the rope plus ¼ of an inch. It rendered it possible to wind from any depth with a small cylindrical drum without too much deviation between the line of the rope and the line of the pulley.

Alfred James said the point of diminished output speed seemed to have been overlooked by the previous speakers, who recommended only a single stage of winding, or rather it was not overlooked, but the emphasis was placed on the wrong side. Mr. Irvine wanted a direct drive "done rapidly" because of the time taken up by any stoppage for a second stage. Mr. Graves spoke about an express train, but Mr. Graves and Mr. Irvine forgot that an express train was a rapid proposition for a long journey only because they could have more trains on the same line. In double stage winding they would have double the amount of stuff in motion. If they had to take 10,000 tons from the bottom of the shaft and had a journey at the swiftest direct speed ever attained but which took ten minutes that would be impossible, but if they could break that journey up into five stages with a 50% slower total speed which would only take three minutes for each stage, then they had a chance, taking up five times as much stuff in fifteen minutes as the swiftest speed would take up "direct" in ten minutes, or a gain of over three times the output. The ideal method, of course, would be to have a number of skips coming up and down in continuous rapid motion on the principle of an elevator. As they could not have that, the next best thing seemed to be to have the speediest number of stages, taking into account the number of stoppages and the total speed of winding attainable, so as to take out the greatest amount of material in any given time and that was an advantage that the two-stage had over the direct system, which blocked transport during the whole period of transit, except for the one skip-load actually being raised.

(TO BE CONTINUED.)

Electricity Direct From Coal.

Hugo Joul, of Chicago, claims to have successfully solved the problem of producing electricity direct from coal. In his apparatus, as described by him, there is a retort surrounded by a cylindrical case containing a battery of four cells. The furnace gases from the retort circulate around the furnace and against the inner side of the case containing the cells, thereby heating the latter. Each cell is divided into three sections by partitions of porous clay. One of these sections contains nitric acid, the adjacent section contains sulphuric acid and the third and larger section contains a ferric chloride solution. In the latter section there is a lead electrode, and the nitric acid section contains a carbon electrode. The operations are described as follows: "A suitable quantity of sulphate of lead is placed in the retort with a quantity of coal nearly sufficient to reduce the sulphate to sulphide, and the mixture is then heated until all of the coal is oxidized. The sulphide is freed from impurities which may have been brought into it by the coal, and is then mixed with sulphate of lead in sufficient quantity to yield metallic lead and sulphur dioxide, which reduction is effected by again applying fuel heat to the retort. The sulphur dioxide passes through a pipe into the larger section of the several cells, reducing the ferric chloride therein to ferrous chloride. Previous to this the generation of an electric current is started by putting the lead electrodes into the larger section and suitably connecting them with the carbon electrodes. The current may be considered as consisting of two currents, one generated by the action of the ferric chloride of the lead electrode, and the other by the action of the nitric acid through the interposed porous walls and sulphuric acid by means of molecular exchange of ferrous chloride. The flow of sulphur dioxide is so regulated that the sulphuric acid formed is not more than sufficient to decompose the chloride of lead formed in the battery reaction. The lead in the retort is allowed to flow into a pan where it is suitably shaped or solidified for an electrode. The sulphate of lead deposited by the battery is allowed to ac-

accumulate, and at intervals is drawn off by means of siphons, and the deposit of sulphate of lead on the lead electrode removed. The temperature of the battery is regulated so that the nitric acid which enters into the sulphuric acid section is evaporated, the vapors being passed through a condenser coil and there condensed again to nitric acid, flowing back into the nitric acid sections through a pipe. The process of distillation, oxidation and condensation is kept up by regulating the temperature of the battery and supplying sufficient cooling water to the condenser. Thus oxygen is supplied to the nitric acid, while the generation of electric energy with consumption of oxygen goes on. The e. m. f. of the cell at 100° C. is said to be about 1.75 volts.

The Kimble Drift Mine, El Dorado County, Cal.

Written for the MINING AND SCIENTIFIC PRESS by
GEORGE W. KIMBLE.

Part of one of the many channels under the lava-capped ridge south and east of Placerville, and between the South Fork of the American river on the north and Wehher creek on the south, constitutes the Kimble drift mine, formerly known as the Green Mountain Tunnel mine.

This channel was first discovered by a tunnel from north side of Chile ravine, extending northerly 400 feet into Cedar Spring hill, at which point an upraise of 10 feet was made to the channel and a tunnel continued up stream 1600 feet along and in the west rip. After a number of tests by washing the gravel, it was decided that the gravel was too poor in gold to pay for working. After years of idleness, the property passed into the hands of the present company.

After making numerous surveys, the writer became satisfied that the property could be made to pay and that the channel, in a long curve, passed under Chile ravine and under the hill to the south. Discovering an old tunnel running from Chile ravine to the south, it was decided to open both tunnels, as the channel could be worked up stream

have two cars loaded and ready on the main track on the return of the empty ones.

GRAVEL.—The gravel consists principally of a well washed quartz and rhyolite (lava) boulders, cobbles, pebbles and sand, intermixed with pieces of slate and lava mud, the latter being the cementing material. In low depressions, where the bedrock was hard, the gravel would be cemented to it as though it was concrete; in these places sulphide of iron in flakes an inch thick would be found in the gravel near the bedrock.

MODE OF BREAKING THE GRAVEL.—Augers with a "swallowtail-pointed" pod were used for boring holes where it was possible, and, wherever it was impossible, crooked-pointed bars, similar to the "Mexican bar," were used. Holes 2 feet deep were put in the bedrock and in the gravel for blasting, using 30% nitro powder. Experience showed that holes 2 feet deep in the bedrock, with holes of the same depth in the gravel and between those in the bedrock, did better execution than if they were deeper, at the same time using less powder. One not familiar with the auger and bar would be surprised at the rapidity with which experienced hands can put in a "round" of holes—twenty-five to thirty—in a breast 60 feet wide.

By this system of holes the gravel is considerably broken up, and, with good ventilation, there is but very little time lost in waiting for the smoke from so many blasts to clear away. After the smoke clears away the men return, pitch out and throw back all boulders and cobbles over 3 inches in size, at the same time shoveling the gravel into cars or onto platforms for the loaders.

TIMBERING.—On an average the ground is not heavy, and the timbering is done with single post and cap, with half lagging on cap, all of which is securely wedged. The caps are supposed to be 6x8x18 to 24 inches, trued up on the top and bottom, and are made from round and split timber. The posts are made of round timbers with a diameter of 6 to 10 inches. The average length for breasting is about 3½ feet.

VENTILATION.—Ventilation is secured by carrying airways in back part of breasts by building up walls of rocks, or by carrying drifts overhead when there were not rocks enough to build walls.

charge; but, after a careful test, it was found that there was no material difference in the quantity of gravel crushed with a single or double discharge; and as it required less water in the mortar for a single discharge, the backs of the mortars were closed. No copper plates were used or any quicksilver put on the mortars, depending on the quicksilver on the grooved tables and the first 12 feet of riffles to amalgamate all the amalgamable gold, that portion of the gold that was not clean and all the black sand to be caught in the remaining riffles. After the pulp passed through the 100 feet of riffled sluices it passed through traps, cobble-paved boxes and ground sluices for 600 feet; the gold from these amounted to only .001% of the gross yield.

The riffled boxes were cleaned up twice a month, the sands put in an amalgamating harrel, 24x48 inches, with six 2-inch round iron bars nearly the length of the harrel, and the harrel revolved for eight hours at a speed of twelve revolutions per minute, after which quicksilver was added and the harrel revolved eight times per minute. Tests showed that there was a thorough amalgamation made when the contents of the boxes was washed through riffled boxes and the amalgam recovered.

COST OF MINING AND MILLING.—From carefully kept accounts, the cost of mining and milling at no time exceeded 45 cents per ton, varying from 38½ to 45 cents per ton, owing to the distance the breasting was from the mill.

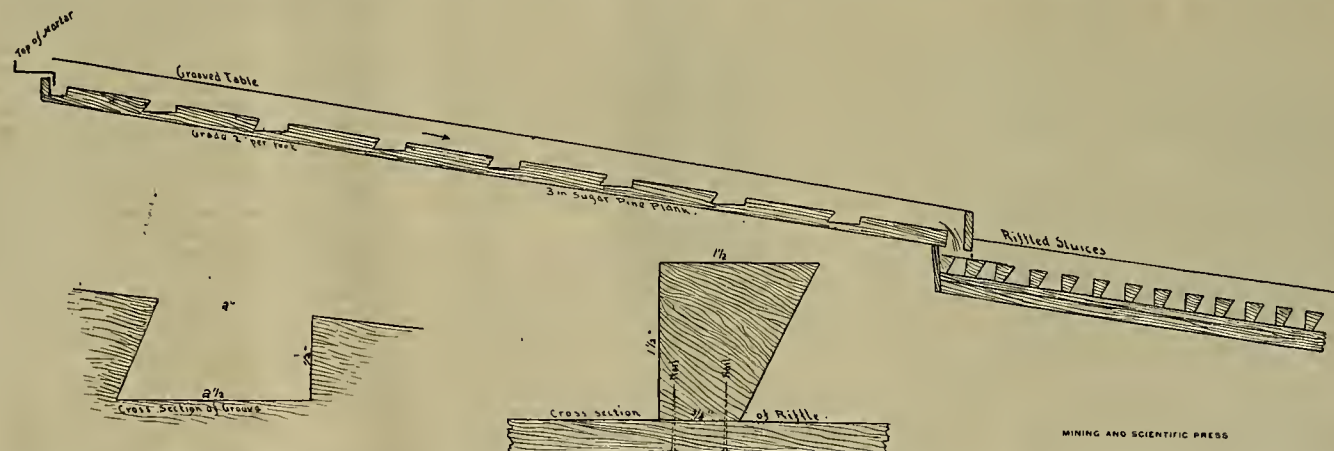
EXPENSES.—Miners, \$2.50; carmen, \$2; shift boss, \$3; power for mill, \$4 per twenty-four hours; timers, 2 cents per linear foot; blacksmith, \$2.75; coal, 1½ cents per pound; powder, 13 cents; fuse, \$4.50 per M; giant caps, \$5.50 per M; steel, 9 cents per pound; lagging, \$45 per M; wedges, \$6 per M.

In giving the cost per ton all expenses are included, except interest on capital invested in purchase of property and building mill.

Mexican Mining Notes.

[FROM A TRAVELING CORRESPONDENT.]

State of Chihuahua, Morelos Mining District: Situated in southwestern Chihuahua, on the San Andreas, or Rio Morelos, 3 miles west of the confluence of that



from both tunnels, thereby having natural drainage. The only difficulty that could be expected would be a sufficient supply of fresh air.

The Green Mountain tunnel, when the present company came into possession of the property, was about 2000 feet in length and badly caved, while the tunnel to the south was about 500 feet long and in a bad condition.

THE CHANNEL.—The channel has been worked out from the intersection of the south tunnel to a point about 1600 feet north of the Green Mountain tunnel intersection, or a total distance of 3000 feet. The average grade of the portion worked was 2%.

The bedrock of the channel was altered and normal diabase, talcose and black slates, with some quartz seams, all of which had a strike nearly parallel with the course of the channel.

MODE OF WORKING.—The channel was narrow and the pay gravel tortuous, with abrupt rims. The breast seldom exceeded 60 feet in width, the average being about 40 feet. In that part of the mine where the Green Mountain tunnel followed the rim, branch gangways were run in the trough of the channel, in order to keep the cars up with the breasting, and in that portion from the south tunnel to the intersection of the Green Mountain tunnel the main gangway was kept in the center of the trough as near as possible, in order to drain the ground and handle the gravel to the greatest advantage. As a result, all new gangways were very crooked; but as the track was twelve pounds to the yard steel rails and a down grade for loaded cars, they would run double by gravity. There were two carmen for each tunnel, who rode their cars out and brought in timbers, tools and all supplies. At each breast there were two or more switches, where the empty cars were switched off as soon as they were brought in, as the loader would

MILLING.—After opening the Green Mountain tunnel and the old tunnel to the south, it was deemed advisable to erect a 10-stamp mill. It was found that the mill would have to be located 350 feet from the portal of the Green Mountain tunnel and 500 feet from that of the south tunnel, in order to get low enough to have an ore bin and the use of self-feeders, and at the same time have a water power.

The mill, as it was built, was ten stamps of 700 pounds each, with Challenger self-feeders, and a water power under a vertical head of 185 feet.

The gravel was dumped into the ore bins from ton cars; from the bin it passed into the self-feeders, thence into the mortars, where it was crushed by the stamps dropping 6 inches 110 times per minute; after which it passed through woven steel wire screens with five holes to the inch, set with the bottom 2 inches above the top of the dies. The pulp, as it discharged through the screens, fell onto the lip of the mortar, thence onto grooved tables 5x6 feet. The grooves were of two sizes and crosswise of the tables. The first groove, which was at the lip of the mortar, was ½-inch wide, ½-inch deep on the front or downstream side, with the back of the groove heveled back under and deep enough to make the bottom level when the table was set on a grade of 2 inches per foot. The next groove was made on the same principle, but was 2 inches wide, with a 4-inch space between it and the first. The narrow and wide ones alternated the full length of the table. These grooves were filled with quicksilver. The tables were made of clear sugar pine 3 inches thick, with covers that could be locked.

After the pulp passed over these tables it dropped onto 100 feet of sluices, with heveled riffles the entire length. [See drawing for explanation of riffles.] When the mill was first built it had a double dis-

stream with the Rio Seneriho, lies the old silver mining town of Morelos. Thirty years ago Morelos was one of the principal gamhusino pueblos in the State of Chihuahua, but to-day the rich surface ores are exhausted and the lead and silver mines of the locality lie dormant awaiting capital to provide the means for working the mines to a greater depth by modern means of extraction. The town presents the same appearance as the old mining camp of San Jose de Gracia in Sinaloa. The architecture and outer trimmings of the grim and silent buildings give evidence of a richer past. Tributary to the pueblo of Morelos are the reales of Los Tajos and La Duro, where American mining men have taken hold and are doing exploitation work with satisfactory results. Further down the Rio Seneribo, what is known as the Promontorio ledge runs through the country in an easterly direction, on which are situated many antiguo mines. This ledge can be traced through the country for 50 miles to the big mining camp of Batopilas. The values of the entire ledge exist in pockets of native and ruby silver. The ore of this section resembles that of the old Aspen Consolidated, which was situated on Aspen mountain, south of the town of the same name in central Colorado. Silver placers exist both at the foot of Aspen mountain and where the Promontorio ledge is cut by the Rio Seneribo. The two principal mines on this belt are the San Gil and San Pedro, which have produced over \$3,000,000 in silver. The oldest mine in the vicinity is the San Joaquin, which consists of nine pertenencias of land and is owned by the Molaney Bros. of La Duro. Mexican gamhusinos are at present taking out a promising class of ore from this property. All the silver mines of this section carry a high percentage of lead and are generally self-fluxing. The Molaney Bros. of La Duro, besides owning

the San Joaquin mine, are interested in some silver and gold mines in the vicinity of Los Tajos and Morelos. A small Huntington mill is on their property at La Duro. This is being torn down and a small stamp mill will be erected to test the ores from their various holdings. Messrs. Milliken & Burgoyne own and operate the Rico mine at La Duro. The property consists of five pertenencias and the values are found in gold and silver. A shaft 150 feet has been sunk, which carries a vein varying from 2 feet to the thickness of a knife blade. The ore is free milling and averages about \$1000 to the ton. A 3-stamp mill is in operation on the property.

District of Guadalupe: At Schollitas J. Robinson of Kansas City is working the Victor mine, which consists of fifteen pertenencias of land, and is a free milling gold ore. The main workings consist of a 150-foot shaft and 200 feet of tunnel. A 2-stamp mill is in operation on the property and the values are found in porphyry and quartz. The ledge runs south to the Los Taros mines and still farther south to where the high country breaks into the harrancas of the Rio San Domingo. Schollitas is situated at an altitude of 8000 feet above sea level on one of the southeast branches of the Rio Fuerte. Freeman and associates have denounced several gold and silver mines in the vicinity of San Jose de Cruz, Rillito and Los Taros. Ivy, Moulton & Co. are working the Sierra Colorow mine, which runs well in gold, silver, copper and lead. The owners propose to erect a 30-ton smelter to treat their ores. West of the Sierra Colorow are the La Cumhre and Los Angeles mines, owned by American mining men. The ores from these properties are principally gold bearing, a large percentage of which is free milling. At La Cumhre a 10-stamp mill is in operation and the production of mineral exceeded \$1,000,000. The property is a steady producer at the present time. The railroad which has connected the mining town of Parral with the Mexican Central Railway has infused new life in that camp, and several claims which could have been bought three or four years ago for a few thousand dollars have recently been purchased for amounts in the six and seven figures. Parral is one of the oldest mining camps in Mexico and has been worked continuously for over 300 years. The town boasts a population of 40,000, and at present in the matter of silver production is a close rival of Guajuata and San Luis Potosi.

District of Santa Eulalia: The district of Santa Eulalia is attracting the attention of mining men and many new denunciations are being made in that section. A recent strike gave an assay of 1000 ounces in silver. Statistics from the Geographical Society of London place the mineral product of this district at \$400,000,000, while Wilson, the historian, estimated it at \$750,000,000.

District of Jesus Maria: The Pinos Altos mines have been sold recently and the new owners propose to operate the property on a large scale. A 100-ton plant is situated on the property, and the value of the improvements will exceed a quarter of a million dollars. The mines have been famous for their gold production. Nearly all the mines in this district change from gold to silver as depth is acquired.

State of Sinaloa, District of El Fuerte: Recently nearly \$10,000,000 has been subscribed for stock of the Kansas City, Mexico & Orient Railway. Locating parties are engaged in running lines between El Fuerte and Agua Caliente de Baca in Sinaloa, and from Minaca west to the Sierra Madres in Chihuahua. Several new contracts have been let for grading west of Minaca.

State of Chihuahua, District of Chihuahua: Work is progressing on the San Jose del Sitio Railroad, near the City of Chihuahua. Twenty miles of new grading contracts have been let. Owing to the pressure on American mills for rails the company have contracted their supply from England.

District of Guadalupe: C. Clark, son of the Senator from Montana, who has been operating the Rosario mines at Guadalupe Calvo, under a bond, has received a three months' extension. The property consists of sixteen pertenencias, and a 10-stamp mill is at present crushing a \$12 ore. It is estimated that over \$22,000,000 have been taken out of these mines. The ledge is in some places over 150 feet wide. Prof. F. A. Shiertz is Supt. and J. Ago is mine foreman. Farther south is situated the mine and mill known as the Garcia. This property is lying idle at present. Between the Rosario and Garcia mine lie a number of pertenencias upon which the Mexican G. & S. Recovery Co. are paying the taxes. The ledge passing through Guadalupe Calvo can be traced for a distance of 75 miles.

New Business.

TO THE EDITOR:—This company has been organized for the purpose of constructing the work proposed by the Tonopah Water & Power Co., and will let contracts in a few weeks for a large amount of work and material. We will first let the contract for digging a ditch 3 feet deep a distance of 65 miles, after which will come the pipe contract, either 10" or 12", which may be either of wood, iron or steel. This will undoubtedly be the longest pipe line in the country, as there is no other spot probably such as Tonopah

where one could locate a town so far away from both wood and water.

The pipe will conduct water from Twin river, Smoky valley, Nev., into Tonopah, while we will generate electricity at Twin river and transmit same with a potential of 30,000 volts. We will also build a complete mill at Tonopah for handling at least 200 tons of ore per day, the mill to be of the latest and best construction. Very truly yours,

L. H. ROGERS,
General Manager Nevada Construction Co.
Carson, Nev., July 7.

Cyanide Assay for Copper.*

(DISCUSSION.)

EDWARD KELLER: Mr. Miller's improved method of the cyanide assay for copper will, without doubt, be much appreciated by assayers and chemists who are engaged at copper mines and works. The writer, as one who, at one time, had much work of that kind to do, entertains no doubt of its practical value.

In enumerating the factors which affect the accuracy of cyanide titration, Mr. Miller omits to mention time. This I have always considered an essential one; i.e., in order to secure accuracy, I have believed it to be necessary to run the cyanide solution at the same rate of speed in standardizing as in the titration of the samples. I have accomplished this, without the use of a timekeeper and without noticing the volume of the solution, in the following simple manner: In running the cyanide solution from the burette, the stream was so regulated, by manipulation of the cock, that it retained its continuity for a distance of about 1 inch below the orifice, and, below that, broke into individual drops. This means that a constant pressure is maintained at the orifice of the burette, so that, during equal intervals of time, equal volumes of the solution pass through. The stream of cyanide solution was left to flow in the manner indicated until the blue ammoniacal copper solution began to show a distinct change in color, after which the cyanide was added by drops at regular intervals until the desired end reaction. When several burettes are used they should have orifices of equal diameter; otherwise, the time factor must be considered separately for each.

In accordance with Mr. Miller's views, I have always considered the cyanide method as of very satisfactory accuracy for all copper assaying in which I did not employ the electrolytic method. It may interest some of my colleagues to know the modified method which I employed some fifteen years ago in making great numbers of copper estimations on ores and metallurgical products of the Butte district. The metals to contend with, as deleterious to cyanide titration, were mainly iron, manganese, and zinc. The mode of operation may be briefly given as follows:

One gram of ore, or other material is dissolved in about 5 c.c. of strong nitric acid; the excess of acid is expelled; the residue is hoiled with a few c.c. of hydrochloric acid; the solution is diluted to about 100 c.c.; ammonia is added to slight alkalinity; the metals are converted into sulphides by the addition of from 1 to 2 c.c. of ammonium sulphide, the latter (prepared by conducting hydrogen sulphide through strong ammonia until saturation) being kept in stock; the solution is re-acidified with excess of hydrochloric acid; the insoluble sulphides are filtered out and washed; the filter, with residue, properly folded, is placed on top of three or four layers of filter paper in a scorifier, and incinerated in the red-hot muffle of the assay furnace; the incinerated residue is dropped into a beaker, dissolved in the desired quantity of acid, and prepared for titration in exactly the same manner as the standard.

The above described method has the advantage that the copper is practically precipitated instantaneously and completely, and the sulphides of iron, manganese and zinc are very quickly removed by solution in hydrochloric acid. If nickel and cobalt were present in appreciable quantities, this method would not be efficient, because, when once precipitated as sulphides, these metals are but slightly soluble in hydrochloric acid. Arsenic, being present as a volatile sulphide, is probably totally removed by the incineration. Antimony is probably volatilized only in part, but the remainder may be oxidized to insolubility. Should lead and bismuth be present in quantity, it would become necessary to remove them from the incinerated residue by solution in acid, neutralization with ammonia, and precipitation as carbonates with ammonium carbonate—thus necessitating an extra filtration. The incineration of the sulphides in the muffle furnace is very convenient and rapid. The placing of three or four layers of filter paper in the bottom of the scorifier prevents any adhesion of the residue to the scorifier, the simple tilting of which, therefore, allows the residue to fall into a beaker, as soon as the scorifier is taken from the muffle. At the time when I used this method I considered it the most rapid for the material for which it was devised, and I believe it to be a very practical method to-day. I am no longer in possession of any data of my own to show the accuracy attained in this kind of work. However, K. W. Mc-

Comas, my assistant, has lately made a series of titrations with known quantities of copper, to which were added equal quantities of manganese in one series, and zinc in another series—creating conditions far more unfavorable than are generally met in practice. The results are as follows:

Copper taken.	Copper found. After separation from zinc.	Copper found. Without separation from zinc.	Copper found. After separation from manganese.
Grams.	Grams.	Grams.	Grams.
0.0993	0.1050	0.1373	0.1016
0.1986	0.2110	0.2668	0.1992
0.2979	0.3163	0.3563	0.2989
0.3972	0.4223	0.5457	0.3988
0.4965	0.5284	0.7061	0.4962

It will be noticed that when the copper has been separated from the zinc the results are still somewhat too high. This is due to the fact that, when much zinc is present, its sulphide cannot be completely separated from the copper sulphide by hydrochloric acid. The results obtained by the titration of the copper without separation from the zinc show the utter unreliability of the cyanide method when it is used without that modification.

Liquid Fuel--Boiler Firing With Oil.*

NUMBER II.

By JAMES W. WARREN.

The oil is stored in two steel tanks, each 30 feet long by 10 feet in diameter, made of $\frac{3}{8}$ -inch steel, which are buried in the ground directly behind the plant. The tanks are buried end to end, 4 feet below the surface, and covered with a 4-inch wood logging treated with a wood preserver to prevent the alkali in the soil destroying the tanks. Between the ends of the tanks is a manhole 4 feet wide by 8 feet long, into which all pipes, valves and connections possible are made, affording easy access to make repairs. The tanks are connected together with both the supply and suction pipes and are filled and emptied both at the same time, but the piping is so arranged that it is possible to use each tank separately, affording an opportunity to clean either of them. The oil is delivered in specially built tank cars, holding from 155 to 300 barrels of oil. A rubber hose 3 inches in diameter is used to convey the oil from the tank cars to the tanks, and gauges arranged on the back of the plant show the amount of oil in each tank. It takes about forty minutes to unload a car of 6,500 gallons. Each of our tanks will hold about 17,000 gallons, and under the present conditions of operation this will last about half a month, affording us a fair storage capacity.

There are two 3x2x3 duplex steam pumps mounted on an iron frame standing about 3 feet 6 inches high. These pumps draw the oil from the storage tanks through a 1½-inch iron pipe into a small chamber about 14 inches in diameter by 2½ feet long, placed between and slightly above the pumps. The oil enters this chamber at one end, passing through a partition of very fine wire gauze into the other end of the chamber, where it comes in contact with a heating coil heated with the exhaust steam from the pumps. This runs the temperature of the oil to about 145° Fahrenheit, being the proper temperature at which the oil atomizes freely. The gauze screen or partition is used to strain the oil and keep back sand and dirt, which, if allowed to pass to the burners, would in time stop up the small openings through which the oil passes. The pump being a double one gives us a reserve in case of accident.

Experiments have been made with two burners, one known as a straight-flow burner and the other known as a cross-flow burner. Thus far we have been unable to see that one burner has any special advantages over the other as regards economy or ease of manipulation. In the straight-flow burner there is a central brass casting with a small hole through which the oil passes. The outside of this casting is fluted like the rifling of a cannon, and outside of this is another brass tube. The steam passing through this space and the fluting, gives it a whirling motion, so that as the oil flows out of the inner hole it is caught by the whirling steam and atomized. It is considerable work to set this burner in place, as there are many changes to make in the brickwork of the furnace. In order to atomize the oil thoroughly, the bridge wall of the furnace has to be reconstructed and a sort of grill work of firebrick put in its place. The grate bars are lowered about one foot in the firebox, and a double row of firebrick laid on top in such a manner as to form an air chamber between them through which all air must pass in order to reach the furnace, the idea being that the air becomes heated before coming in contact with the fire. There are two of these burners under each boiler, each one being set in the firedoor, and the door bricked up solid, except a small hole for looking into the furnace. When once set up it is rather difficult and expensive to change back to coal.

The cross-flow burner is constructed somewhat differently from the straight-flow burner. It consists of small casting with an overhanging top per-

*H. H. MILLER, Trans. Am. Inst. M. E.

*Read before the National Electric Light Association at its twenty-fifth convention held at Cincinnati, O., May 20, 21, 22, 1902.

forated with small holes arranged in a semicircle on the under side. Just below these holes is a slot in the burner through which the steam issues in a sheet, and the oil being forced through these holes comes in contact with the steam and is atomized. This burner is put through a hole between the firedoors, using only one burner to a boiler. The grate bars are left in the same position as when coal is used, and are covered with a layer of firebrick laid in mortar. These bricks cover the entire grate except a few inches in front for air, and the bridge wall is left as used for coal. The furnace doors remain unchanged. The principle of the oil burner is that the steam comes in contact with the oil and atomizes and separates it as widely as possible.

To convert a furnace from coal to oil will take from two to three days, and to convert to coal again from two to three minutes, where the cross-blow burners are used. After being once equipped for oil, however, and then converted to coal, it could be reconverted to oil again in about an hour.

In the use of fuel oil it is necessary, in order to get economical burning, to have the oil flow to the burners at a steady pressure. Our first experiments demonstrated the necessity of this, as our fires were often put out through unsteady pressure. With a steady pressure of steam at the burners, if the oil pressure decreases, the steam is likely to blow out the fire, while if it increases, more oil comes through the burners than could be properly atomized, the result being, 1st: The fire smokes badly. 2d: The excess of oil runs away in the ash pit, causing liability to explode. 3d: It fills the tubes with a soot that is much harder to remove than coal soot. 4th: The oil that is not atomized, and flows away, is lost.

In order to ensure a steady pressure of oil it is necessary to provide an auxiliary air chamber. Connected to this air chamber is a small safety valve which, in case the pressure runs above the point required, returns the excess oil to the storage tanks.

To start the burners it is simply necessary to turn on the steam and a small supply of oil, and throw a piece of burning waste into the firebox, and we immediately have a full fire. To regulate it properly it is necessary to adjust the supply of both steam and oil until the fire burns without any smoke; and if properly regulated we get a complete combustion of the oil and avoid almost entirely the presence of soot in the tubes and smoke from the stack. It is also possible, by simply increasing the supply of both steam and oil, to force the boiler to any extent. Care must be taken, however, in selecting burners to get one that thoroughly atomizes and distributes the oil so as not to confine the fire to any one part of the shell and burn the boiler.

The boilers are provided with peep holes in the back to enable the fireman to see the condition of his fire. Care must be taken to watch the fires very closely, and in case they go out for any reason to shut off the oil immediately, as the gas from the oil, combined with the air in certain proportions, is very explosive. Cases of this kind have been known where an explosion has occurred which took the damper up the chimney and blew out the front of the boiler.

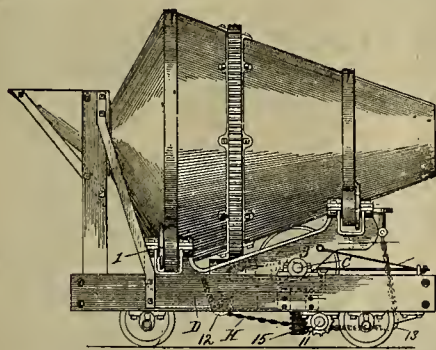
(TO BE CONTINUED.)

Mining and Metallurgical Patents.

Patents Issued July 1, 1902.

Specially Prepared for the MINING AND SCIENTIFIC PRESS.

ROTARY MIXTURE FOR CONCRETE.—No. 703,424; W. J. Judd, New York, assignor to F. C. Austin, Chicago, Ill.



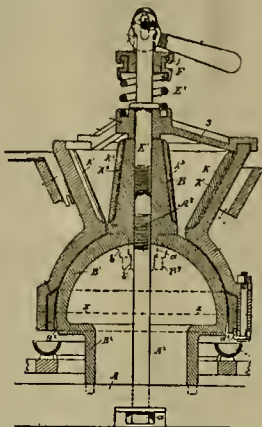
Concrete mixer, comprising rotary mixing drum having oppositely arranged charging and discharge openings provided between openings with external ring gear; rotary driving shaft arranged under drum transverse to axis, about which drum revolves; tilting drum support forming double armed lever fulcrumed to tilt about axis of rotary driving shaft, gear connection between rotary driving shaft and gear ring on drum; anti-friction rolls arranged upon arms of lever engaging and supporting opposite end portions of rotary mixing drum.

MINERAL COMPOUND.—No. 703,516; McK. Arnn, Bristol, Va.

Method of treating slag from furnaces, consisting

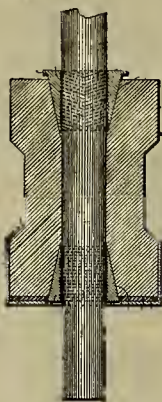
of addition to molten slag of salt, lime, sulphuric acid, hydrochloric acid, coal tar, pulverized mica, talc, kaolin, clay and water, ingredients combined with slag substantially in proportions and in manner set forth, separating out of lighter portion of mass and subsequent pulverizing of compound thus formed after same has become cold and mixing with each 100 pounds pulverized mass thus produced of five pounds coal tar, one pound sulphuric acid, five ounces hydrochloric acid, mixing same with ordinary cement in proportion of 20% of product with 80% of ordinary cement.

ORE CRUSHER AND PULVERIZER.—No. 703,461; A. J. Petter, San Francisco, Cal.



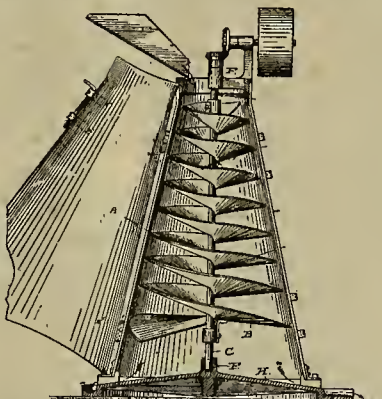
In combination head; shell depending from head; second shell on outside of first mentioned shell; means for regulating pressure of one shell upon the other, comprising stem on head, spider slidable on stem engaging end of outer shell, spring seated on spider, bearing for upper end of spring, slotted ears on bearing, cam lever at end of stem working in slotted ears adapted to press upon spring bearing to tension spring.

TAPPET FOR STAMP MILLS.—No. 703,680; J. C. L. Vaught, Phillipshurg, Mont.



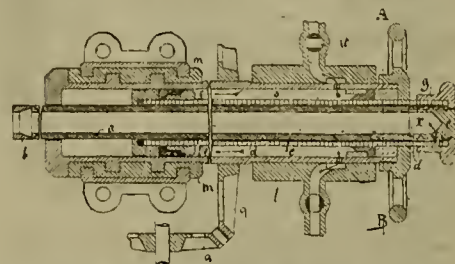
Device of class described, comprising tappet, lower tapering or wedge-shaped sleeve fitting within lower end of tappet, provided with horizontal corrugations or ribs adapted to engage stamp stem, and upper tapering or wedge-shaped sleeve provided with longitudinally inclined ribs or corrugations adapted to engage stamp stem, whereby the upper sleeve is fed downward.

AMALGAMATOR.—No. 703,694; J. V. Coleman, San Francisco, Cal.



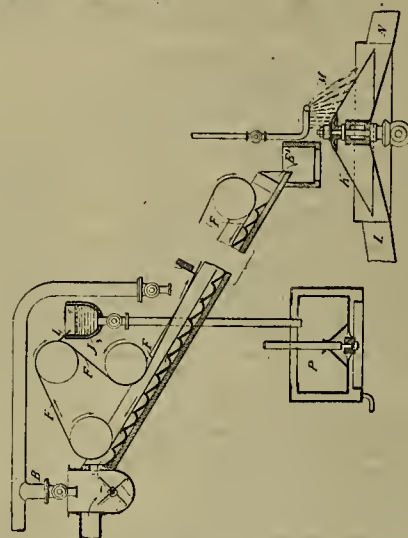
In amalgamator, conical casing, conical spiral journaled vertically therein, inner surface of casing and upper surface of spiral being formed with amalgamating surfaces, each portion of periphery of spiral located interiorly of vertical plane through corresponding portion of spiral below it, exteriorly of vertical plane through portion of casing above it, spiral having unobstructed outer edge and means of rotating spiral upward toward smaller end of casing.

ROCK BORING MACHINE.—No. 603,890; J. Brejcha, Strasburg, and E. Schulte, Dusseldorf, Germany.



In combination in boring machine, boring rod, cylinder k, piston head f within cylinder, piston rod d connected to piston and within which boring rod is located, connection between hollow piston rod and boring rod, comprising head g, pin h and screw plug c.

APPARATUS FOR THE SEPARATION OF MINERALS BY THE SELECTIVE ACTION OF OILS.—No. 703,905; A. S. Elmore, London, England.



Apparatus for effecting separation of minerals by selective action of oils and like substances, comprising mixer of oil with aqueous pulp of pulverized mineral, incline for downflow of mixture having steps or baffles, endless apron, means for distributing oil over it and means of causing it to travel in direction opposite to downflow, conical revolving sieve adapted to receive discharge from incline, nozzle for delivering shower of water over one side of sieve, two launders, one lined with blanket adapted to remove matters that pass through sieve, the other to remove matters that are washed over sieve.

MINE VENTILATOR.—No. 703,831; P. T. Reynolds, Butte, Mont.



Combination with fluid supply pipe and cooling mixture tank of plurality of rotatable tubes arranged in vertical series, passing through interior of, passing through and journaled in walls of cooling mixture tank, each tube in interior of tank provided with sinuous bends in same plane, one end of each tube communicating with supply pipe and other end with atmosphere.

ELECTRO-METALLURGICAL TREATMENT OF ZINC ORES AND ESPECIALLY BLENDE.—No. 703,857; C. J. Tossizza, Paris, France.

For electrolysis of nickel, cobalt, cadmium, zinc, electrolytically deposited in metallic form at cathode, and other metals whose salts have a voltage of decomposition too high to avoid decomposition of sulphurous acid in medium of electrolyte, process effected with voltage lowered by employment of sulphurous acid as depolarizer, being divided into two parts to avoid decomposition of sulphurous acid, consisting in electrolysis of salt of metal with corresponding solution of copper anodes and formation of copper salt, and in the electrolytic reconstitution of copper anodes by decomposition of so-formed copper salt in solution preliminarily charged with sulphurous acid.

CONSIDERABLE coke is used in Arizona. The Bisbee smelting plants are credited with a daily consumption of 125 tons, Detroit Copper Co. 80 tons, Arizona Copper Co. 80 tons, Shannon smelter 40 tons and the Old Dominion of Globe 40 tons; total, 365 tons. This does not include the coal used, which is said to be about 27,000 tons per month.

Mining Summary.

Specially compiled and reported for the
MINING AND SCIENTIFIC PRESS.

ARIZONA.

COCONINO COUNTY.

Manager J. E. Jennings, of the Grand Gulch Co.'s property, reports that since November, 1899, shipments aggregating 1000 tons have been made, for which \$98,959.88 was received from the smelter; the controls show an average of 44% copper, five ounces silver and approximately \$1 gold per ton; \$29 per ton was spent for transportation, \$23 for wagon haul and \$6 by railway. The main shaft is 370 feet and will go to 800 feet. It is estimated that there are 3000 tons of ore that will carry 10% copper.

COCHISE COUNTY.

At Bisbee, McNichols and Ross of British Columbia drilled 41 $\frac{3}{4}$ inches in fifteen minutes in the contest on the 4th inst.

GILA COUNTY.

T. Crandall is superintending development Confederate M. Co.'s claims near Reno.

Supt. F. D. Adams, Bob Tail M. Co., near Globe, has started the mill. The Arizona Commercial Co., at the Copper hill mine, has continued work. Supt. W. S. Sultan had opened the mine to a depth of 600 feet and sulphide ore bodies had been developed.

The tunnel head of Mineral creek is in 250 feet. It has gone through 28 feet of sulphide ore carrying 4% copper.

At Globe the briquette works connected with the Old Dominion smelter will be ready Sept. 1. Experts who have been examining the Old Dominion properties are making favorable reports.

The main shaft and other improvements on the Globe-Boston are nearing completion.

GRAHAM COUNTY.

U. G. Wolf is Supt. Polaris G. M. Co., near Clifton, on the Nonesuch and Golden Eagle claims. The Nonesuch is showing 18 inches of ore. The 20-stamp mill will be ready to run in September.

MARICOPA COUNTY.

T. J. Carrigan and D. Morgan, Supt. and foreman of the Congress mine, are developing a group of eleven claims adjoining that property. The work is being concentrated on the Lucky Dave.

MOHAVE COUNTY.

A. J. Doran, who has the Nighthawk mine near Kingman, proposes to put a hoisting plant thereon.

A concentrator may be put on the Gem mine at Cerbat.

PIMA COUNTY.

C. Udall, Supt. Century Ore Co., is operating a cyaniding plant at Mammoth. He says his company has a contract with the Mammoth-Collins Co. to treat 300,000 tons of tailings. The plant is using 200 tons daily. The value lies in the molybdenite of lead extracted used in the hardening of steel. He says the Century Co. has a contract with the United States Steel Corporation to furnish the entire product of the plant. The mine produces two and one-half tons of concentrates daily, which is shipped to a smelting plant in Pennsylvania.

McPhaul & De Span have sold their mining claim to Dent & Pollock of Flagstaff for \$10,000 spot cash. The ore carries copper, gold and silver. The present owners propose to put machinery on for development. This property is in Pimosa district, about 100 miles from Tucson.

SANTA CRUZ COUNTY.

At Washington the Pride of the West has in operation a combination process of magnetic and water concentration, and smelting in a reverberatory furnace; the pulp from hearth roasters falls into hoppers, upon broad belts, where it is automatically spread to a depth of $\frac{1}{4}$ inch. These belts pass closely beneath magnets, across the faces of which run other belts. The magnets pick the copper particles from the pulp, they adhering to the under side of the belts passing over the faces of the magnets, until they have passed beyond, when the copper falls upon a carrier, to the reverberatory furnace, which produces a 60% matte.

G. W. Bibbens, general manager Pan-American M. Co., has bought a group of gold claims near Dos Cabezas.

The company running the Patagonia reduction works is buying ore and increasing its holdings. At the Poland mine, 10 miles northwest of Patagonia, a Hooper pneumatic dry concentrator is being installed. The company has let a contract for 1500 feet of development work.

YAVAPAI COUNTY.

The Dunkirk G. & S. M. Co. has organized at Prescott, general manager, A. B.

Noxon, Prescott. The company own the Dunkirk, West Dunkirk, Kentucky Judge and Keno. Considerable ore has been shipped from the property. A road is being made by the company through the camp from the Crown King stage road.

At the Henrietta mine of the Braganza G. M. Co., Big Bug, a new working shaft is being sunk and a contract has been let for a 1500-foot tunnel. The new 20-stamp mill is finished. Manager P. A. Johns has fifty men at work. The high-grade ore is shipped to the smelter on the Agua Fria, the lower grade worked in the 20-stamp mill.

The Black Hills district is attracting attention. The Iowa M. & D. Co. will work the Conger mine. The Monarch G. & C. M. Co., adjoining the Conger, is sinking a two-compartment shaft 500 feet. The Coronado G. & C. M. Co. is arranging to spend considerable money on its mines.

The Wheel of Fortune, 3 miles south of Prescott, has been secured by a company from Hartford, Conn., who expect to put a stamp mill on the property.

YUMA COUNTY.

The Bullion Bar Dredging Co. is expected to start the gold dredger of the Advance Gold Dredging Co. at the Pot-holes, 14 miles above Yuma, next month.

CALIFORNIA.

AMADOR COUNTY.

(Special Correspondence).—The east shaft on the Kennedy has been sunk 2550 feet, with 60 feet additional for a sump. Stopping is continued between the 2100 and 2300-foot levels.

Jackson, July 6, 1902.

The Record reports at the Bunker Hill mine a vein of milling ore in the north 800 level. The new compressor to operate the pumps and power drills will be run by electricity.—Crosscutting at the Lincoln mine has begun.—At the Central Eureka forty stamps are running on good-grade ore.

The Gwin mine is adding twenty stamps—making 100 in all—new hoisting machinery and a gallows-frame 100 feet high; eighty stamps are now running.

The Argonaut mine is awaiting the verdict of the U. S. Supreme Court in the litigation between that company and the Kennedy Co. The shaft is filling with water below the 1400-foot level.

At the Sargent mine, at Middle Bar, the new hoisting works will be finished next month.

BUTTE COUNTY.

The Mercury says that the Gold Bank mine at Forbestown may soon be idle. About thirty-five men are employed at present and they are taking out ore in a few places where good milling ore is still to be had. "Prospecting has been discontinued and it is the present intention to abandon the mine as soon as the ore in sight is passed through the mill."

CALAVERAS COUNTY.

Near Mokelumne Hill, W. L. Huston is superintending development work on the Easy Bird mine, the property of the Emma M. Co.

In the 100-foot level in the Guiffra mine 25 feet more will tap the shoot; the mill will then be started. The vein gouge is 2 feet in width and carries rusty gold.

On the Sierra Railway extension the rails are laid to Carson Hill, and next month the company will be hauling freight to Angels. The road will be built to the Ghost mine.

At Campo Seco work is going ahead at the copper mine. An addition will be made to the smelting capacity and more men employed.

S. W. Payne has charge of the Esmeralda mines, near San Andreas.

The Last Chance mine at Angels has been bonded for one year to Salt Lake men for \$200,000. Work has begun.

KERN COUNTY.

The Kinyon and Wedge mines and eighteen claims, Randsburg, will be worked by the Con. M. Co. under the management of Percy McMahon.

The Randsburg Miner says the Butte lode's cleanup of eighty-one tons of ore at the mill of the Stanford M. & R. Co. resulted in three gold bars worth \$5800.

Chicago bankers have closed a contract for a block of about \$3,000,000 of the bonds of the Edison Electric Co. of Los Angeles. The Los Angeles Edison Co., in addition to building a new steam plant and enlarging its present water power plant, will install an additional water power plant on Kern river, which will be capable of developing about 20,000 H. P. This plant will be located near Bakersfield, and the power will be transmitted over a double pole to Los Angeles, a distance of about 100 miles.

KINGS COUNTY.

The pipe line of the Standard Oil Co. is laid 5 miles south of Angiola. The work is progressing at the rate of 3000 feet a day.

MADERA COUNTY.

J. P. McFarland, formerly manager and Supt. of the Alpa and Eclipse gold mines, has brought suit against J. P. Martin and J. Quadt, who are now operating the mines, to recover a third interest in the property.

MARIPOSA COUNTY.

F. P. Mills, Supt. Merced G. M. Co., of Coulterville, has men repairing ditches and flumes.

MONO COUNTY.

In the Standard Consolidated mill at Bodie for the week ending June 28, 443 tons of ore were crushed, average assay vanner tailings, \$5.52; concentrates produced, 1.42 tons; assay value, \$79.22; amalgam produced, 1645 ounces; assay value, \$2.43 per ounce. Tailings plant No. 1 treated 401 tons tailings.

NEVADA COUNTY.

Near Grass Valley, the Standard sinking goes on under the superintendence of H. Thomas.

The 20-stamp mill on the Allison Ranch mine, near Grass Valley, is to be in operation in September.

PLUMAS COUNTY.

Fifteen men are employed at the See & Jolly mine, Granite Basin.

At Rich Bar the Rich Bar M. Co. has been drifting on the bedrock; pumping machinery will be put in.

Cooley Bros. are cleaning up their gravel claim after the season's run; it is generally expected they will take out \$10,000.—Borentz and Fallet, at the mouth of Mill creek, have good pay in their gravel mine.

The Cataract G. M. & Power Co. has bought the Indian Boy mine—sixty acres along the bed of the North Fork. Supt. C. L. Adams has built a $\frac{1}{4}$ -mile ditch—5000 feet cut through solid rock; it is 5 feet deep at top, 3 feet at bottom and 2 feet deep. He will buy an elevator. The Cataract Co. also owns 240 acres covering the ancient channel on the divide between Yellow creek and the North Fork.

The Feather River Con. M. Co., with a deposit of cemented gravel, will put in a 300-ton milling plant.

SAN DIEGO COUNTY.

Mesa Grande reports that G. Lewis has sold his tourmaline mine there to McCarrroll & Ross for \$10,000.

Under the heading "A Mining Deal," the Arizona Republican says: "The plant of the California King M. Co. changed hands yesterday," but gives no particulars. The place of operations is at Pica-cho, 48 miles north of Yuma.

SANTA CLARA COUNTY.

The new furnace at the Silver Creek quicksilver mines, near Evergreen, is finished.

The Santa Teresa quicksilver mine is being reopened.

SHASTA COUNTY.

On the 9th a \$20,000 fire in the town of De Lamar consumed fifteen houses in the upper portion of the camp.

A 30 H. P. steam boiler will be put in at the Mt. Shasta mine.

The Mt. Shasta M. Co. has bonded the Phoenix mine, near Shasta, and has put men to work.

A railroad from the Southern Pacific line at the mouth of Pit river, to accommodate the business of the De Lamar smelter and other Bully Hill interests, is projected, the main line to be constructed by the Southern Pacific and Bully Hill M. & S. Co. to Copper City where its Winthrop mine is located, that it can transport the ore from this property to the smelter on its own line, as probably 80% of the freight would be hauled between that point and De Lamar.

SIERRA COUNTY.

At the Swansea mine good gravel is opened up. The mine is at Chipps Flat, 1 mile east of the Plumbago.

Nearly all the hydraulic mines near Downieville have finished the season's work.

SISKIYOU COUNTY.

At the Orcutt mine, 12 miles from Orleans Bar, a tunnel has been driven 147 feet, crosscutting three ledges.

Wood & Sheldon have bonded their copper mine near Sisson to an English company for \$100,000, with the stipulation that twelve men should do development work for a year. A cash payment of \$15,000 was made.

TUOLUMNE COUNTY.

The Stockton G. M. Co. say they have struck the old channel and find it 300 feet wide and rich.

Several carloads of pipe for the App mine have been received at Quartz.

Near Confidence, the Confidence mine has two machine drills. Twenty stamps are in operation. The cyanide plant is ready to begin; capacity, 100 tons of tailings daily; 100 men are employed.

The Contentment mine, near Columbia, is bonded for \$10,000 to C. F. Summers.—

The Lady Washington mine, near Carters, is bonded to W. H. Martin of San Francisco for \$30,000, payable before June 1, 1903.

J. S. Raggio and D. A. Lumsden have bonded to F. Chappell, Jr., the Golden Annie quartz mine, near the main Tuolumne river, with the purchase price fixed at \$2000, payable within six months.

The Morris Tunnel Co. propose to run a tunnel from the Morris Tunnel dump to the boundary line of the Bald Mt. quartz claim.

A. James has sold to C. W. Gammon of San Francisco, for \$4000, the Markham mine.

The Neale mine, Bald Mt., last week yielded \$5000 gold.

R. Stanford, Supt. Von Tromp M. Co., operating gravel and quartz claims near Columbia, is reported having left matters in bad shape, disappearing and leaving several unpaid bills for material.

The mill returns at the Keltz show that the ore mined is of good average value.

The Sonora Democrat says that, under the management of W. Rule, the Bell mine is showing good ore.—At the Dutch mine the ore shoot on the 1200 is 14 feet in width and rich in free gold and sulphurets.

The owners of the Bald Mountain pocket mine will spend \$4500 to drain the mine. They propose to extend the Morris tunnel, now in 700 feet, 475 feet farther to the east.

TRINITY COUNTY.

A 7000-pound rock crusher will be put in at the Chloride Bailey mine.

At the Fairview mine J. Potter has fifty-five men employed.

YUBA COUNTY.

Members of the U. S. Debris Commission have been at Deguerre Point and along the channel of the Yuba river to examine the site of the proposed barriers. It is expected that contracts may be let this season.

COLORADO.

BOULDER COUNTY.

(Special Correspondence).—The Logan group of mines in the Sugar Loaf district, operated by the Clinton M. & M. Co., Boulder, have produced in the past four years something over \$400,000, \$50,000 of which was extracted in free gold. The property, which is composed of ten patented claims, is operated by a series of adit tunnels. The tunnel in which they are now working is No. 4, and cuts the vein on the dip 850 feet deep. The best ore taken out of this tunnel the past month ran \$209 per ton, and the free gold ore averaged \$10 per pound. The ore shoot in No. 4 tunnel is 200 feet long, with ore in the breast and still driving the tunnel ahead. The ore carries roscoelite combined with telluride of gold and silver, which is characteristic of the ore throughout the entire property. They are employing thirty men. They have four tunnels, about 7000 feet in all. These four tunnels are equipped with ventilating shafts through to the surface. This company has not closed down a day during the past four years, with the exception of Christmas and Fourth of July. S. B. Dick of Meadville, Pa., is president.

The Chamberlain-Dillingham Ore Co. are handling about thirty tons of ore per day. Most of their ore comes from Jimtown, Gold Hill, Wall Street and Magnolia.

Boulder, July 6.

The Great Western Ex. & Red. Co. is reported unable to dispose of the output of its tungsten mines at Nederland. Last year the Railroad reduction mill at Boulder was leased and a trial run was made on thirty tons, concentrating five in one, and leave a concentrate, which was then quoted at the market price of \$130 per ton. A small quantity of the concentrates was exported to Germany; the remainder lies in the mill waiting for a market. Enough ore is blocked out in the mines at Nederland to supply the world with tungsten. A Boulder assayer and metallurgist says that if the company would put the concentrated tungsten on the market at the low price their immense deposits would warrant, that it would be used in the manufacture of the present "pipe steel."

CLEAR CREEK COUNTY.

The Golden Lily 20-stamp mill at Yankee is reported saving values on all ore handled. Assayer C. Steel gives returns of .08 and .18 as the best that has been shown in the concentrates. Assayer Valentine of Cripple Creek gave returns on concentrates sent to him from the mill of .17 and .11.

The Banty mine, Spring gulch, will be worked by the Spring Gulch G. M. Co. The shaft is down 250 feet. The ore is galena and gray copper, with values of \$50 to \$100 per ton. Manager McFarland begins shipments next month.—The Gold Cord Co. have their mill in operation on Chicago creek, treating Lexington ores.

—At the Golden Hecla Manager Boyd has sixteen men at work.—The Comstock is being worked under bond and lease by C. J. Hughes of Denver, J. S. Clark manager.—The Cripple Creek & Idaho Springs Co. own the French Flag mine and will sink the shaft to a possible depth of 1000 feet. W. J. B. Blade is Supt.—The Kelley tunnel is going ahead 8 feet per day, now in Republican mountain 600 feet.

Georgetown reports considerable good ore in sight in the Wisconsin mine. The ore body is 2 to 4 feet in width, the first class running \$150 to the ton and the second class averaging \$75.

Near Georgetown A. Z. Harman will build a cyanide mill. The company owns 500 acres of placer ground. Average tests show a value of \$10 per ton.

Geo. St. Clair, manager New Philadelphia M. Co., now has control of the Rosecrans.—The Royal Co., operating on Miller mountain, have a vein in their tunnel and will build a mill if the ore holds out. W. C. Marshall, at Empire, manager.

The parties who have been sampling the Benton have concluded to take out 1000 tons, which will be sent to the Carpenter smelter at Golden, and on the result, says the Gazette, depends the future of the Benton. The ore body is large and thousands of tons are in sight.

The Conqueror group of mines on Silver mountain has passed into the hands of Eastern men, with P. C. DuBols of Berkeley, Cal., as Supt.

H. H. Sturm, manager Republic group on Silver mountain, has twenty-six claims and 105 acres. A new mill is to be erected. The Mint group, on Covode mountain, is being operated by R. S. Grier.

Near Yankee Hill the Pioneer mill, remodeled by Brinkerhoff & Preston, is turning out values from old properties.—The Ore Verde has a tunnel in 1000 feet, with an upraise of 180 feet, where is ore on which men are drifting.—H. I. Seeman will shortly start his mill.

Near Georgetown shipments are made from the Dunderberg.—The Bisma shows ore running 58% lead and 630 ounces silver, or \$356 per ton.

One hundred and eight feet were driven at the Empire tunnel in June through extremely hard rock.

Supt. Branham of the Georgetown G. M. Co. is sinking a three-compartment shaft 4½ by 10½ feet.

W. D. Shepard, manager Western M. Co., operating the Anglo-Saxon Extension property, tells the Georgetown Courier he has permitted the bond he held for his company on the old Anglo-Saxon mine to lapse, pending the clearing of the title.

EL PASO COUNTY.

The U. S. Smelting Co., backed by the U. S. R. & R., says it will build a \$1,000,000 smelter at Colorado City to handle the bi-product of zinc-lead derived in smelting gold and silver copper ores.

FREMONT COUNTY.

Florence reports that the Bassick mine has been developed by a new shaft to a depth of 1500 feet. Good values have been found and will be shipped. The ore deposits are in shape of boulders, often coated with a layer of gold. Three of these ore channels have been disclosed in the 1500 feet of sinkings and tunnels. The channels vary in length from 30 to 110 feet and some of them have entered fully 140 feet.

At a meeting of the board of directors of the Rocky Mountain Smelting Co. of Florence, held in Chicago on the 6th, the smelter in Florence was turned over to W. K. Johnson and C. J. Seeley of Denver. Repairs will begin October 1. Mr. Johnson is general manager of the company.

GILPIN COUNTY.

The Chamberlain sampling works at Golden and Black Hawk are sampling and buying ore in carload lots for the Carpenter smelter at Golden. The ore is to be of a value of not more than \$15 per ton, and the charges \$5 50 per ton for freight and treatment, with 50 cents added for sampling. Ore carrying over 50% silica will be charged at the rate of 5 cents per unit of 50%.

GUNNISON COUNTY.

The Augusta mine, near Pittsburg, Elk Mountain district, is owned by the Augusta Metal M. Co., whose work will cut the ore bodies showing in upper workings 1600 feet deep. The company will next year build a concentrating mill. A tramway will be put in connecting the new tunnel with the mill. The present output is five tons daily shipping ore.

At Gunnison on the 4th in the drilling contest, Bailey and Henderson of Vulcan took first money by drilling 37½ inches in Gunnison granite.

HINSDALE COUNTY.

Lake City reports the Dupre Co. shipping high-grade ore from their Burrows

Park property. The California Co. is grading for a power plant at the mouth of California tunnel. The Hanna Co. has its mill and tramway completed.

P. C. Newitt has charge of the Henson Creek Lead Mines property, succeeding W. Wearne, resigned.

Manager O. W. Pierce of the Tobasco Co. has resumed work at the mine. The power plant is finished and work on the mill, tramway and dam is under way. The whole works will be ready for operation Sept. 15.

LAKE COUNTY.

In and around Leadville low-grade iron and iron, lead and zinc sulphides are produced to the amount of about 2500 tons daily, including the A. M. W., 250 tons; A. Y. & Minnie, 125; Ibox, 250; Resurrection, 150; Penn Co., 50; Home M. Co., 200; Iron Silver M. Co., 250; Yak M., M. & T. Co., 200; Small Hopes M. Co., 150; Carlhou, 100; Phoenix Co., 100; Midas Co., 200; Mikado dump, 75; Fryer hill leases, 100; Carbonate and Iron hill leases, 100; other leases, 100 tons.

The Leadville News Dispatch says in sixty days increased force will be put on the several mines mentioned at \$3 per day: Moyer 100, A. Y. & Minnie 150, A. M. W. 100, Mahala 50, Greenback 150, El Paso 300, New Monarch 200, Resurrection within the year 100, Yak 100; total new men employed 1250.

The Bimetallic smelter at Leadville will not be reopened.

The Doris Co., Iowa gulch, will decide on the 22nd inst. as to resumption of work.

Leadville reports a strike on the group south of the Continental Chief, at the head of Iowa gulch. The assays average 200 ounces silver. In the Helen Gould tunnel the vein almost covers the entire breast. Assay returns show 25% copper, 78 ounces silver, .52 ounce gold. The group consists of the Silver Cliff, Silver Chief, Horseshoe Prince and the Hill.

LARAMIE COUNTY.

Pearl reports arrangements completed whereby the Grant Copper M. Co. will secure title to 2000 feet of additional territory lying on the vein which is the chief source of the company's ore. Sinking on the ore body is being pushed. The company may co-operate with the Tully Copper M. Co. in installing a concentrating plant at the mine.

MONTEZUMA COUNTY.

Near Mancos, on the Doyle properties, five contracts on adits are under way. The company is paying over \$1000 per month, exclusive of contracts. Supt. Toll has the mine tracks laid and much of the machinery in place.

OURAY COUNTY.

At Ouray F. J. Hulaniski has made final payment on seventeen gold claims adjoining the Camp Bird, Revenue and Virginian companies, and has sold the properties to the San Pedro G. M. Co., which proposes to build a mill thereon.

W. R. Kramer, of the Governor, Sneffels district, says his company will build a 10-stamp mill.

PITKIN COUNTY.

Aspen reports Roaring Fork properties promising favorable results. A new shaft is going down at the Keystone. The Percy Consolidated is worked through the Newman tunnel. In the La Salle claim of this property, which joins the Keystone on the south, there is reported to be ore which runs 75 ounces in silver and 25% lead. Manager G. Newman is employing a large force of men.

SAN JUAN COUNTY.

J. W. Dodds, manager Poverty Gulch M. Co., is working two shifts on six claims in Porphyry gulch, near Chattanooga.

The Early Bird property, near Mineral Point, has a 240-foot tunnel on the vein. Twelve cars of ore shipped therefrom netted the owners \$6500. The ore ran three ounces gold, 150 ounces silver and 6% copper to the ton.

SAN MIGUEL COUNTY.

At Telluride the Pennsylvania tunnel is being pushed to the Sheridan. The ore from the Smuggler-Union mine will be brought through the tunnel to be sent to the mills at Pandora. At the mine 450 tons are daily sent to the mills. The company has 350 men on the payroll at the Bullion tunnel, 80 at the Contention mine in Bear Creek basin, and 100 are employed at the mills at Pandora.

Vanadium steel is reported introduced in France by A. B. Frenzel of Telluride. Considerable deposits of vanadium ores have been found in San Miguel county. Recent researches have shown that a small percentage of vanadium will increase the tensile strength of steel 100%. The Creusot works of Schneider & Co. are reported experimenting with the new material.

At Telluride the Alta mill is treating seventy-five tons of ore per day, which makes on an average thirty-five tons of concentrates, of a value, after the expense

of shipping and smelting are deducted, of \$35 a ton.

Men are employed at the Pennsylvania tunnel and where the Sheridan vein is intersected. A force will be put to work on development and a raise driven to connect the Pennsylvania with the Bullion tunnel. After the intersection of the Sheridan the tunnel will be extended to cut the other veins that form the Smuggler-Union group.

SUMMIT COUNTY.

The French Gulch G. P. Co. and the American G. D. Co., Swan valley, have good placer gold output.

The Gold Pan hydraulic elevator pit, Blue river, Breckenridge, is 50 feet deep. The tallings have accumulated in the Blue river. Work is being pushed on the rubber belt conveyor to take tallings from the end of the flume up an incline over the track of the Colorado & Southern railway's South Park branch.

Manager J. A. Bush has resumed work on the Mount Gilead and the Glen-Mohawk groups.

TELLER COUNTY.

A reduction of smelting charges of non-contract ores in the Cripple Creek smelters from \$1 to 50 cents has been made. In smelting contract ores the smelter knows exactly what it has to handle and can make better rates. With non-contract ores it does not. The reduction will be of benefit to owners of low-grade mines. The new rate went into effect July 10, and will be \$7.50 per ton instead of \$8.

The cyanide mill on the Ironclad mine, Ironclad hill, is in operation. It is owned by A. H. Heller and A. L. Steward.

Cripple Creek district produced during June 50,700 tons of ore, gross bullion value, \$1,866,000. The new mill of the Portland company and the Telluride plant at Colorado City figure in the above. Both plants have been in a measure experimenting and low-grade ores have been treated at both, to fill up leakages and get the machinery in regular running order. Next month the Republican thinks these plants will show an increase in tonnage and the grade of ore treated will be improved.

The June production of ore treated by the Economic mill at Cripple Creek was 4620 tons, average value \$33 50 a ton.

The Isabella G. M. Co. has a contract with the Pike's Peak Power Company for a 30-H. P. hoist to be placed on the Emma.

Cripple Creek's production for June was:

Plant.	Ton-nage.	Av. Value.	Gross Value.
U. S. R. & R.....	19,000	\$29	\$551,000
Union.....	12,000	30	360,000
Economic.....	3,200	30	96,000
Telluride.....	1,500	30	45,000
Eureka.....	1,500	10	15,000
Dorcas.....	1,500	25	37,500
Smelters.....	12,000	63	756,000
Totals.....	50,700		\$1,866,000

At Cripple Creek the sheriff has sold the properties of the Rebekah G. M. Co. to M. B. Carpenter, of Denver, for \$97,000. Mr. Carpenter represented the creditors, who held a judgment of \$76,437.68 against the mine, exclusive of the surface improvements and machinery.

President Roosevelt, Attorney-General Knox and Secretary of the Interior Hitchcock have refused to reopen the Hull City placer claims against the patentees of the placer. J. A. Owenby, of Denver, who claimed an original interest in the placer location, interviewed the President several weeks ago and laid before him data tending to establish his claim. The whole matter was gone into in detail by our Cripple Creek special correspondent in last week's issue.

IDAHO.

IDAHO COUNTY.

Welser is sending some statements made by recent arrivals from Thunder Mountain that are apparently more for boom purposes than as actual facts. Ore samples for which \$100 were refused, ledges of ore 12 feet wide, running \$2000 gold to the ton, and placer claims yielding \$20 per day per man, may do for advertisements in Boston and St. Louis papers, but will not fool many miners. Here is a further specimen: "Mr. Haggerty is an experienced miner and gives it as his opinion that in three years Thunder Mountain will prove to be the greatest mining camp in America. He says the Dewey is a greater mine than the famous Treadwell in Alaska. Almost every known mineral is found in the camp. He reports H. E. Taylor having discovered a large body of platinum, the location of which he will not disclose." Very likely he will not; platinum in place is too rare a thing to be "disclosed." The truth is good enough, and no good purpose is served by such manifest exaggerations.

The Salt Lake Tribune avers that the hanging up of the White Knob Co.'s mines and smelter at Mackay is the out-

growth of troubles in the family, and that as soon as these are adjusted the order to resume will be forwarded. It is claimed that the physical condition of the properties was never as good as it is at present, and that recent reports concerning high-grade disclosures on the 800-foot level were without exaggeration.

At Buffalo Hump the Crackerjack's new mill is in operation and is expected to pay dividends at the end of each thirty days' run. The mine is opened to a depth of 150 feet; there is in sight ore blocked out. A lower tunnel will be started to give the mine 150 feet additional depth. W. A. Stevens has put up the money for development, construction of mill, building of roads, etc., and for a one-third interest in the property.

The Jumbo and its four stamps are producing \$5500 per month. The owners will increase the stamps to ten.

L. McAtee will put a small stamp mill on his property near the town of Hump.

OWYHEE COUNTY.

The Avalanche says Slaker tunnel is a success. The War Eagle Con. M. Co. have a ledge of ore that will run \$20 gold uncovered in the south drift, 5 feet wide, 3 miles east of Silver City.

SHOSHONE COUNTY.

The Morning mill at Mullan is building an extra vanner room to work over tallings which are now shipped out and used as railroad ballast.

WASHINGTON COUNTY.

E. D. Ford, manager Salzer-Ford properties, Black Lake, Rapid River district, has men opening the road that machinery can be taken in.

Talking of Thunder Mountain's prospects, H. B. Brown thinks mining companies will not employ many miners until transportation shall be opened to a point where the food and supplies can be gotten cheaply. Under the present charges for taking freight into the camp it means an expenditure of \$5 a day to hire and feed a miner. In a low-grade camp such as Thunder Mountain proves to be, it is not wise to do extensive mining when the costs are so high. He thinks there are about 100 men at work at the mines in the camp.

Stewart & Myers, owners of the Silver King mine at Warren, will put a 10-stamp mill on their property. A 300-foot tunnel, with a 6-foot ledge of ore, is on the property. Another tunnel will tap the ledge at a depth of 1300 feet.

MISSOURI.

HOWELL COUNTY.

The works of the Renfrew Zinc Oxide Co., of West Plains, and the Alice mine at Weatherhill are sold to the Empire Zinc Co. of Joplin for \$200,000. The Joplin Co. is a branch of the New Jersey Co., the zinc oxide trust.

JASPER COUNTY.

Joplin reports total sales for the six months of 1902 ending June 30 aggregated 138,007 tons of zinc and 16,051 tons of lead, an average of 5231 tons of zinc and 618 tons of lead per week, and the average weekly value was \$175,590.

The zinc sales were 2312 tons of zinc more and 938 tons of lead less than the first six months of 1901. The value is \$547,857 more.

There was an increase of ore sold of 322 tons of zinc and 17,000 pounds of lead over the preceding week.

The turn-in by camp was as follows:

	Zinc.	Lead.	Value.
Joplin....	2,611,840	309,200	\$50,361
Cartersville-Webb City....	2,070,700	369,710	39,748
Galena-Emple....	1,094,980	82,500	17,956
Aurora....	810,880	.....	11,620
Duenweg....	1,032,810	69,000	17,630
Zincite....	414,510	10,560	7,295
Spurgeon....	262,280	50,790	3,186
Central City....	196,250	2,890	2,720
Prosperity....	404,420	26,860	7,102
Neck-Alba Cave....	279,160	.....	4,606
Springs....	201,870	14,500	3,544
Oronogo....	311,140	.....	4,959
Sherwood....	26,320	17,650	792
Carthage....	133,780	.....	2,207
Granby....	334,000	25,000	4,485
Carl Junction....	143,280	.....	2,404
Reeds....	135,890	.....	2,174
Seneca....	21,280	.....	160
Peoria, I. T....	8,900	5,760	197
Total sales	10,494,260	984,420	.....
Total value	\$158,972	\$23,974	\$182,946
Twenty-six weeks....	272,014,080	32,102,070	.....
Value—26 weeks....	\$3,873,933	\$691,416	\$4,565,349

MICHIGAN.

HOUGHTON COUNTY.

An electrical engine, Saginaw, will furnish the power for the six heads of stamps in the addition to the Hecla mill of the Calumet & Hecla. It is the only engine of its kind in the copper country.

MONTANA.

B. H. Tatem, assayer in charge of U. Assay Office at Helena, reports the value of metals produced in Montana during 1901 to be \$60,387,619.01. The sums of the gold, silver, copper and lead was distributed as shown in the following table:

Metals.	Quantity.	Value.
Gold, fine ozs.	232,331.454	\$ 4,802,717.39
Silver, fine ozs		
(coining rate).....	14,180,545 19	18,334,442 26
Copper, fine lbs @ \$16 117		
per cwt.....	228,031,503	36,751,837.34
Lead, fine lbs.		
@ \$4.334 per cwt.....	11,304,892	498,662.01
Total.....		\$60,387,619.01

The gold product of 1901 originated from the sources shown below:

Classed as	Fine ozs.	Value.
Placer hullion.....	25,285 602	\$ 522 699.78
Mill hullion.....	72 961 647	1,509 251.10
Cyanides.....	57,013 558	1,178,574.84
From copper ores.....	45,850 574	947,815 48
From lead ores.....	6,479 641	133 946 07
From smelting ores.....	24 740.432	511,436 12
Total.....	232,331.454	\$4,802,717 39

PRODUCTION OF GOLD AND SILVER IN MONTANA DURING THE CALENDAR YEAR 1901 BY COUNTIES:

GOLD			SILVER		
By Counties.	Fine ozs.	Value.	Fine ozs.	Value.	Total Value.
Beaverhead.....	6,064 884	\$ 125,372 28	240,823 88	\$ 311,368 22	\$ 436,740 50
Broadwater.....	5,238 107	108,281 28	175 462 66	226,860 81	335,142 09
Cascade.....	1,422 857	29,413 06	250,294 41	323,612 97	353,026 03
Choteau.....	74 862	1,547 54	30 60	47 32	1,594 86
Custer.....	4 328	89 47	.34	.44	89 91
Fergus.....	33,618 681	694,959 81	8,746 10	11,308 09	706 267.90
Flathead.....	2,247 287	46 455.55	40,186 09	51,957.79	98,413 34
Granite.....	10,566 047	218,419.58	1,827 868 32	2,363,304 49	2,581,724 07
Jefferson.....	4,472 870	92,462 42	169 687 01	219,393 30	311 855 73
Lewis and Clarke..	51,090 691	1,056,138.32	133,149.24	172 152 55	1,128,290 87
Madison.....	41,079 113	849,180 63	183,772.94	237,605.42	1,086,786 05
Meagher.....	89 883	1,858.05	240,005 30	3 0309.88	312,167 93
Missoula.....	3,349 788	69,246 26	845 28	1,092 89	70,339.15
Park.....	9,433 012	194,997 66	2,994 16	3 871 24	198 868 90
Powell.....	7,837 787	162,021 43	81,694 72	105,625 53	267 646 96
Ravalli.....	1 300 526	26,884 25	90 26	116 70	27,000 95
Silver Bow.....	47,132.745	974,320.31	9,638,071.42	12,461,344.86	13,435,665.17
Returns from custom smelters, mints and assay offices, impossible to classify by counties.....	7,307.986	151,069 48	1,186 816 46	1,584.469 76	1,685,549.25
Total.....	232,331.454	\$4,802,717.39	14,180,545 19	\$18,334,442 26	\$23,137,159 65

Production of copper and lead in Montana during the calendar year 1901:

Summary By Counties.	Copper Fine lbs.	Lead Fine lbs.
Beaverhead.....	103,691	767,259
Broadwater.....		2,407 036
Cascade.....		852 288
Flathead.....		300,000
Granite.....	7 198	6 464
Jefferson.....	128,196	66 404
Lewis and Clarke..	13 900	77,488
Madison.....	3,000	
Meagher.....		2,500,000
Silver Bow.....	227,742,262	138,846
Custom smelters in addition to above, not possible to distribute by counties	33,256	4,399,107
Total.....	228,031,503	11,504,892

FERGUS COUNTY.

Capt. Emerson, E. R. Beatty and W. G. Moore are inspecting the property of the Montana Texas & Colorado Co. at Kendall, 100 miles east of Butte. The rock is an altered lime, carrying values of \$8 up to \$10 a ton, and is amenable to cyaniding. The company will exploit the ore showing at hand and later build its own reduction plant.

GRANITE COUNTY.

J. H. Hand of the Crescent Mining Co. is making an inspection of the company's properties on Stony creek.

C. N. Chapin is manager of the Montana G. M. Co. at Princeton.

G. Weaver is assistant superintendent Good Hope mine.

Supt. J. Schneider, near Phillipshurg, will put the Dorothy G. M. Co.'s claims in Boulder district in shape for a new reduction plant, capacity 200 tons per day. The milling ore runs \$22.50 to the ton.

LEWIS AND CLARKE COUNTY.

Nearly all the old employees of the American S. & R. Co.'s plant at East

Helena have signed an agreement with the company. The smelter will reopen next week.

Helena reports the Farmer lode ore body 7 feet wide.

Fifty men are employed at the Big Indian property, constructing the 60-stamp mill.

The Ellison & Southern Railroad, a branch of the Northern Pacific, is to be extended to a point within 2 miles of the Beatrice mine.

MADISON COUNTY.

McFadden, Irving & Drackert have \$867 net from a shipment of ten tons of gold ore made from Pony. So far this year they have made \$6,000 out of the property they are working under lease.

Returns on shipments of concentrates made from the Carmin mill near Pony from the Oregon mine, 25 tons second-class, gave a saving of 71%. The shipment netted \$700.

MISSOULA COUNTY.

The Silver Bell mining property, west end of Missoula county, 12 miles from Eddy, is sold for \$25,000 to Dr. W. F. Robinson of Missoula.

PARK COUNTY.

At Livingston the Yellowstone M. Co. has incorporated to work the Venus, Jupiter, Saturn, Mars, Eureka, Albany, Climax, Climax Extension, Savage, Long Chance, Morgan and Troy quartz claims.

SILVER BOW COUNTY.

The receiver for the Snohomish and Tramway mines shows that during May the Snohomish yielded 573 tons first-class ore and some second class. The Tramway yielded sixty-two tons of first class.

Magnolia M. Co., Mono M. Co., Boston De Lamar M. Co., and other adjoining claims, comprising about 1600 acres of gold-bearing property, covering the vein for a distance of 3 miles.

LYON COUNTY.

The Gold Canyon Tunnel Extension Co. is having a contract signed by the mine owners of Silver City by F. Leonard, Jr., to secure drainage of their mines. There has been spent by different companies for pumping more than enough to have met the cost of a drainage tunnel. The terms are: A royalty averaging 10% of the production will be paid the tunnel company when the tunnel reaches a point within 500 feet of any of the mines or mining claims, or when the mines are drained within 2000 feet. All waste rock may be transported through the tunnel at a cost of 10 cents per ton per mile, but mine owners having shafts may hoist their ore and waste if more convenient. All ore or waste excavated in running the tunnel will belong to the tunnel company. The tunnel company has the option to mill ores at the rate of \$2.50 per ton for concentration and \$3 per ton for crushing and cyaniding. All parties owning mills are excepted and not affected by this clause. In case mine owners do not work their claims for a period of four months, the Gold Canyon Co. may operate for the account of the owner, paying to the owner 50% of the proceeds. Wherever ore is found in any mine the owner has the right to take possession immediately and work the mine, paying the agreed royalty and the actual disbursements incurred by the tunnel company for development work in that mine. The Comstock Tunnel Co. offers to do its work at cost.

NYE COUNTY.

C. E. Knox, manager Mizpah Extension Company's property at Tonopah, says there are seventy-five wagons plying between the camp and the loading stations at Sodaville and Candelaria with ore, at these points the platforms are breaking under a tonnage which is waiting on rolling stock for its removal to the main line of the Southern Pacific. Some of these wagons are drawn by six animals, others with trailers are drawn by as many as twenty-two. He said \$4 a day awaited experienced miners and work also for a few carpenters and timbermen.

The Salt Lake Exchange will list Tonopah stocks.

The Bonanza says twenty first-class miners can find employment in Tonopah.

STOREY COUNTY.

The 4-inch casing for the Davis drill has arrived at Virginia, at the drilling plant on Brunswick-Potosi. Superintendent Gibson will resume work with a 3-inch drill.

The Virginia Miners' Union celebrated its thirty-fifth anniversary July 4th.

The Savage mine reports: We have opened the seventh floor in the upraise above the north drift from No. 2 east crosscut and have stope the south one set on the sixth floor. The fillings at this point show a slight improvement in grade. Have saved for the week twenty-three mining carloads of ore, the car sample of which assayed \$13.78 per ton. This ore has been placed in the bins at the Best & Belcher mill, which will be started shortly on the accumulated ore.

WHITE PINE COUNTY.

W. T. Hook, manager New York & Nevada C. M. Co. at Ely, projects the purchase of a 500-ton smelter.

C. M. Spence, of Jasper, manager Black Forest M. & S. Co., will put in a 30-ton smelter.

Manager C. P. Weber, of the Sapho Mining Co., says a concentrator of 100 tons daily capacity will be built at Keystone, 3 miles distant from the mines of the New York & Nevada Co.

NEW MEXICO.

BERNALLILLO COUNTY.

W. R. Uttley will build a 150-ton smelter at Algodones.

GRANT COUNTY.

J. L. Schofield & Co. have been running steadily since January on the tailings at the old Bell & Stephens mill, Pinos Altos. The tailings are fed into an amalgamating pan having a continuous discharge onto plates. After leaving the plates they go through an amalgam trap into the concentrator, which in this case is a large rocker, 4x12 feet, driven by power. About 65% of the values recovered are caught in the pan and on the plates, the balance in the concentrates. The saving averages 90%.

OREGON.

BAKER COUNTY.

Near Baker City E. Everett, manager Uncle Dan G. M. Co., is doing experimental work.

A deal is reported pending for the

E & E, which has twenty stamps. The Magnolia is expected to open with ten stamps. The Quebec has ordered ten more stamps and the Prairie Diggings will add twenty-five to the present battery. The North Pole has commenced work on twenty, which will make the total for that property thirty.

Near Sumpter the following are in present operation:

	Rolls,	Tons. Stamps.
Golconda.....	100	20
Bonanza.....		40
Badger.....	100	20
Columbia.....		20
Red Boy.....		20
Monumental.....		20
Bald Mountain.....		20
North Pole, cyanide.....	30	30
Don Juan.....		10
Mammoth, mill.....	40	
Quebec.....		10
Pyx, or Phoenix.....		10
Prairie Diggings.....		25
Cougar, cyanide.....	250	
Black Hawk.....		5
Virtue.....		20
Flagstaff.....		20
Cornucopia.....		20
Perry.....		10
Connor Creek.....		35
Gem.....		10
Sanger.....		20
Balsley Elkhorn.....	50	
Gold Hill.....		10

The Red Boy proposes to sink 1000 feet deeper.

Cable Cove reports that at the Baby McKee an 1800-foot tunnel is being driven by Manager Townsend at a depth of 3000 feet below the apex, that crosscuts may be run each way. J. T. Temple will work the Alpine group at the same level.

The Imperial projects a 3000-foot tunnel at the base of the mountain.

Supt. McGhan has twenty-five men working underground at the Virtue mine and is running fifteen stamps on good ore.

LANE COUNTY.

C. Harding of Eugene, who owns the Treasure claim in the Blue River district, says he will build a 20-stamp mill on the property.

MALHEUR COUNTY.

At Malheur the Red, White & Blue mine is sold to Eastern men by Mrs. M. Richardson for \$20,000—\$7500 down.

The Sunset M. Co., on the Malheur river, reports 2 feet wide of milling ore that assays \$25 per ton.

SOUTH DAKOTA.

LAWRENCE COUNTY.

Supt. Frazier of the Alder Creek M. Co. as the result of a twenty-eight days' run has a brick valued at \$10,000.

The Pluma M. & M. Co. will start their mill July 28

The Belt Development Co. is working on its property in South Lead, getting ready to sink 500 feet farther. O. B. Amsden is general superintendent. C. L. Amsden is in charge of work at the mine.

The Butte, Mont. Miners' Union has loaned the Lead Union \$20,000. The Terrapeak Miners' Union has also advanced \$6500 and a joint mortgage on the property of the Lead City Union is taken by the Butte and Terrapeak Unions.

Lead City has two 200 stamp mills, one 160-stamp mill, one 180-stamp mill and two cyanide mills. The ore runs from \$14 to \$17 a ton. The deepest mine is down 1100 feet.

The Gold Reward smelter and cyanide mill at Deadwood is treating 600 tons per day; 400 tons at the smelter and 200 tons at the cyanide plant.

The Dakota M. & M. Co. is operating a 30-stamp wet crushing cyanide mill at Deadwood on ore from its mines in the Portland district at Bald Mountain. The cost of treatment at this mill is \$1.34 per ton.

PENNINGTON COUNTY.

The National smelter at Rapid City is treating 200 tons of ore daily.

YANKTON COUNTY.

The new cyanide mill in course of erection by the Homestake Co. at Gayville, for the treatment of tailings from the Father De Smet, Caledonia and Deadwood-Terra mills is nearing completion. The plant will have a daily capacity of 800 tons.

UTAH.

Utah's metal production for 1901 was as follows:

	Quantity.	Value.
Gold, fine ozs.....	184 803	\$ 3 820,216
Silver, fine ozs.....	11,319 860	14,635,779
Copper, fine lbs.....	26,931,888	4,340,612
Lead, fine lbs.....	99,102,516	4,295,103
Total.....		\$27,091,710

The value of the gold, silver, copper and lead produced by the mines of the State of Utah in 1901 was \$27,091,709.75, having

been the largest in the history of the State, and a gain of more than \$4,000,000 over the year 1900, which had previously shown the greatest yield.

The quantity and value of each metal produced in 1901, the value of the gold and silver being computed at the coinage rate and that of the copper and lead at the average market price for the year, is shown in the table which follows, together with corresponding figures for 1900, so that the changes may readily be noted.

It may be noted that the not increase amounts to .9%. The increase of silver came from the Park City district, while the production of copper increased in all of the mining districts of the State, but more especially in that of Bingham. The decrease in gold was comparatively small. The location of this decrease was in the Tintic and Mercur districts and due to various local causes. All other districts of the State show a gain in the amount of gold won, the most noteworthy being Kimberley, where the Annie Laurie mine is located. The Bingham district also shows a very creditable increase in its production of gold.

The quantity and value of the gold from the different classes of ore in 1901 is shown in the following table:

Classed as	1901— Fine ozs.	Value.
In quartz and dry ores....	6,688,150	\$ 138,256.32
In cyanide mill bullion.....	98,793.489	2,042,242.66
In lead ores....	17,724.888	366,405.96
In copper ores....	43,521.388	899,666.94
In milling ores....	18,075.018	373,643.78
Total.....	184,802.933	\$3,820,215.66

The mining of silver in Utah is done largely in connection with ores carrying lead and other metals, where the values have principally been in silver. The mining of such ores was curtailed by the decline in the price of silver that occurred in 1901. In the table given below the origin of silver from the several branches of mining for the past two years, and such changes as occurred therein, are noted:

Classed as	1901— Fine ozs.	Coin'g value.
In quartz and dry ores....	850,266.61	\$1,099,334.65
In cyanide mill bullion....	48,213.26	62,336.34
In lead ores....	7,357,481.54	9,512,703.35
In copper ores....	2,201,143.66	2,845,923.11
In mill'g ores....	862,755.00	1,115,481.21
Total.....	11,319,866.07	\$14,635,778.66

Two-thirds of the entire silver yield of the State originated in ores carrying lead, thus giving an importance to this class of mining greater than attaches to the others.

The yield of gold in 1901 as distributed to the counties of the State is noted in the following table:

Counties.	1901— Fine ozs.	Value.
Beaver.....	1,003.718	\$ 20,748.69
Iron.....		
Juab.....	40,158.989	830,159.99
Piute.....	18,008.721	372,252.63
Salt Lake.....	27,911.565	576,983.25
Summit.....	13,731.376	283,852.73
Tooele.....	80,978.768	1,673,979.70
Utah.....	120.000	2,480.62
Wasatch.....	339.729	7,022.82
Impossible to classify.....	2,551.067	52,735.23
Total.....	184,802.933	\$3,820,215.66

BEAVER COUNTY.

Near Frisco the Horn Silver mill is closed down, owing to a lack of water. Underground work is reduced pending negotiations between the management and the smelter company over a working charge at the latter's furnaces. Developments at the Cactus and the results of experiments at the concentrator have created interest in that property.

EMERY COUNTY.

Price alleges an offer of \$10,000 has been made to the locators of the uranium deposit, Green River.

JUAB COUNTY.

It is locally stated that the management of the Grand Central of Tintic has assurance from the Oregon Short Line that its Tintic branch will be extended to the dump, that the loading of ores direct upon the cars may begin next month, and that nearly 70,000 tons has been guaranteed by the Bingham Con. smelter management. For the hauling, the railway, under the revised tariff, receives \$1.50 per ton.

All operations at the Swansea of Silver City, which has \$300,000 dividends to its credit, are indefinitely suspended. Manager Geddes says the cause is the decline and depression in the silver market and advance in the price of supplies of every description, from candles to drills. He says there are 125,000 tons of ore exposed.

SALT LAKE COUNTY.

The Rio Grande Western railway made a flat rate of 75 cents a ton, regardless of the quantity or quality of ore, in carload lots from Bingham to the valley smelters. The new rate effects a saving to the producer of 50 cents a ton, or about \$15 a carload, the previous rate having been \$1.25 per ton. When the company first extended its tracks into Bingham the rate on ore was \$2.25 per ton, and that charge has been gradually reduced to 75 cents.

The Highland Boy Con. M. Co. has prepared its complaint, and apex proceedings are lodged against the Petro. The Highland Boy's smelter furnaces in June produced 1,141,520 pounds of pig copper, carrying gold and silver.

The new million-dollar smelter of the American S. & R. Co. is in commission. The plant has eight, each capable of handling 125 tons per day. The old Germania smelter will continue in service until the new attains its complete capacity, and will then be converted into other uses.

Supt. T. G. Cole of the Ben Butler, Bingham, last week shipped two carloads of ore carrying lead, with some gold and silver, and has extracted 100 tons of milling ore for the Dewey mill, in Bingham canyon. He has four faces of ore on which to work.

SUMMIT COUNTY.

Near Park City, the Silver King mill started up its entire plant, new slime rooms, dryer, etc.—The Thayne's Canyon Con. Co. will sink a vertical shaft on their property.—Mayne & Co., on the Perry group, will continue sinking the shaft to contact.

WASHINGTON.

COWLITZ COUNTY.

At Kalama, the Darnell M. & M. Co. will build a fifty-ton cyanide plant. The plant will consist of a 50 H. P. engine, hoiler, rock crusher, ore mill, four cyanide tanks, dynamo for electric lights. The Red Star M. Co. has a 6-foot ledge of quartz carrying gold and chnabar. The tunnel on the Copper Dyke is showing ore, carrying copper 2%, gold \$1. Two other ledges have been discovered on the property, carrying gold on the surface \$2.80 and \$2.65 each.

FERRY COUNTY.

Republic reports that the manager of the Wauconda mine has suspended work. It is locally stated that Rossman, Edwards & Co. want to lease the mine for a period of years and would erect a plant of 500 tons daily capacity.

PIERCE COUNTY.

J. T. Davis of Tacoma has sold to an Eastern company for \$50,000 control of an arsenic mine on Mineral creek, 50 miles southeast of Tacoma. The mines have been developed with 1400 feet of shafting and tunneling, 5 miles of wagon road, a saw mill, electric plant and hoisting machinery. A tramway 1500 feet long is being constructed. The purchasers will have the reduction works completed in September, involving the installation of machinery. The product will be sulphide of arsenic and oxide of arsenic.

STEVENS COUNTY.

Marcus reports a strike on No. 2 vein of the Little Monster. According to a reported test made by the Northport smelter, the ore runs half an ounce gold, 286 ounces silver and 9% lead. The owner, L. R. Phillips of Marcus, says ore is stored for shipment.

YAKIMA COUNTY.

At North Yakima F. H. Nagler, secretary Elizabeth M. Co., says he has assays showing the Elizabeth ore to contain \$335 gold, \$12 silver and \$1.68 copper.

FOREIGN.

BRITISH COLUMBIA.

Rossland reports a serious shortage of cars which curtailed shipments of ore last week. The Le Roi sent out 2350 tons; the Le Roi No. 2, 1250; Giant, 120 and War Eagle, 90; total for week, 3810 tons; for year to date, 165,646 tons. The scarcity of coal, owing to the miners' strike at Fernie, has inconvenienced the mines. The Le Roi mine is using wood in its compressor, the War Eagle and Centre Star are importing Rosslan coal, while the Le Roi No. 2 and affiliated properties are independent of the coal supply, as they use compressed air generated by electricity.

On the 4th inst. a meeting of the Le Roi M. Co. was held in London. A proposal was laid before the shareholders to assess the stock 10 shillings per share, but the motion to that effect was defeated. The adoption of the proposal would have involved a reorganization of the company; its defeat means that for the present there will be no reorganization.

The B. C. Coal Co. of Nelson will use a diamond drill outfit in prospecting the company's coal area on the North Fork of Kettle river, 60 miles north of Grand Forks. It is proposed to prospect the ground to a depth of 500 feet.

MEXICO.

Monterey reports that the Guggenheim interests have acquired the Tiro General mine, Charcos district, near San Luis Potosi, for \$450,000. The property is silver and lead producing.

OAXACA.

There are several United States corporations operating in the district of Ocotlan; two are St. Louis corporations, one a Pittsburg and one from Oregon. The Carpintero is sold for \$40,000 to the Compania Minera Cuauhtemo, to be developed under modern methods. Hamilton, Wiltsee and Jackson are interested in Ocotlan district.

SINALOA.

R. A. Thomas, representing Los Angeles men, has bought the Reforma group of mines. These mines are situated near La Junta, on the line of the Kansas City, Mexico & Orient railway.

Personal.

H. HOLMAN is Supt. Desert King M. Co., Wedekind, Nevada.

S. E. BRETHERTON of Val Verde, Ariz., is visiting San Francisco.

E. E. CHASE has returned from Park City, Utah, to Denver, Colo.

DUDLEY GRAY is manager U. S. & R. Co.'s plant, Canyon City, Colo.

G. MCM. ROSS has returned to Virginia, Nev., from San Francisco.

PHILLIP ARGALL has returned to Denver, Colo., from a trip to Arizona.

S. W. TYLER of Denver, Colo., is examining property at Bingham, Utah.

G. W. HULL is general manager Sullivan M. & S. Co., Cranbrook, B. C.

SUPT. KIRBY of the Daly-West, Utah, mine, has withdrawn his resignation.

JNO. H. STEPHENS is assayer at the Rawhide mine, Tuolumne county, Cal.

J. M. McLAREN has been appointed mining adviser to the Indian government.

JNO. CLAGGETT is superintendent the Pride of the West, Washington, Arizona.

J. J. BROUGHALL will take charge Aug. 1 of the Daly-Judge concentrator, Tintic, Utah.

G. H. JOHNSON of Philadelphia, Pa., is in Denver, Colo., looking after his mining interests.

F. H. BOSTWICK, of the Hendrie & Bolthoff Mfg. Co., Denver, Colo., is in San Francisco.

F. E. SCHWARZ of Denver is in Park county, Colo., inspecting some mining properties.

A. P. GRIFFITHS has been appointed general manager Palmarejo & Mexican Gold Fields Co.

V. G. HILLS, M. E., has returned from Santa Maria del Oro, Durango, Mexico, to Cripple Creek, Colo.

M. F. PERRY, general manager Minas Prietas Reduction Co., Sonora, Mexico, is in Virginia, Nevada.

R. A. TREVARTHEN has returned to Cripple Creek, Colo., to assume charge of the Midget, on Gold hill.

W. D. PINKSTON has charge of the Alameda G. M. Co.'s operations near Westville, Placer county, Cal.

W. P. KINNEY has been elected secretary and treasurer Colorado Springs, Colo., Mining Stock Association.

ASST. SUPT. J. SHIELDS of the Tamarack and Osceola mines has succeeded C. Bedell as Supt. Quincy mine, Houghton, Mich.

J. A. UNDERWOOD, superintendent of the Clarissa, and one of the lessees of the Sioux-Utah at Tintic, Utah, has returned from New York.

F. M. DRESCHER, E. M., has returned to Denver from Terco, Colo., where he has been for the Colorado Fuel & Iron Co., working on their coking plant.

RALPH NICHOLS, general manager Great Boulder Perseverance Co.'s gold mines at Kalgoolie, West Australia, is in San Francisco, Cal., en route home.

T. J. GREENWAY, formerly manager Broken Hill South M. Co. and the Broken Hill Block 14 Co., has been appointed manager mines of the New Chillingoe R. & M. Co., Australia.

H. A. CULLOM has charge of three stamp mills near Hailey, Idaho, and is now in Shoshone, Idaho, to start up a fourth one belonging to the company owning the other three.

DANIEL McDONALD, president of the American Labor Union, has returned to Butte, Mont., after several weeks in Denver, Colo., where he gained his new title. Mr. McDonald was formerly president of Western Labor Union.

DR. A. J. CHANDLER, of Mesa, Ariz., has gone to Europe to interest capital in an enterprise for the construction of a water power electric plant on Kanabwash,

60 miles from Williams, near its junction with the Colorado river.

W. J. HOWARD, 3226 Champa St., Denver, Colo., has been engaged by a London mining corporation as general superintendent of their properties in South Africa, India and West Africa, being in the latter section at present in charge of the properties of the Wassau Gold Coast M. Co., Ltd., of London, at an annual salary of \$15,000.

P. M. NEWHALL of the University of California, goes to South Africa as mine surveyor in the Witwatersrand Deep at Germistown. H. W. Pudan, a California University graduate, goes to Johannesburg to take a position there as mining engineer. C. H. Aspland of the California University, goes to Germistown, South Africa, to take a position as sampler in the mines.

ROBERT MCF. DOBLE, C. E., of San Francisco, is in the East for the purpose of placing the orders for the machinery and other material required for the construction of the 110-mile hydro-electric power transmission of the Guanajuato Power & Electric Co., in Mexico, for which company he is consulting and supervising engineer. Power is to be supplied to the silver mines at Guanajuato, Mexico.

Commercial Paragraphs.

THE Rand Drill Co. has established a Salt Lake, Utah, office in charge of G. W. Topliff, Commercial Club Building.

THE San Francisco office of the Westinghouse Electric & Mfg. Co. has been moved from the Mills Building to 425 Market St.

THE American Steel & Wire Co., Chicago, report the receipt of ten gold, four silver and four bronze medals at the South Carolina Inter-State & West Indian Exposition, which closed May 31, these medals representing the highest awards in each class.

THE Joshua Hendy Machine Works, San Francisco, Cal., have installed a complete electrical plant for the Duplex M. Co. at Searchlight, Nev., with sufficient capacity for lighting, drilling and pumping purposes. They have also furnished a large double-cylinder, double-drum hoisting plant to the Tyee mine on Vancouver island, B. C. The Willamette Pulp & Paper Co. have ordered from the Joshua Hendy Machine Works a large size rock crusher for their manufactory at Oregon City, Or.

THE Central California Electric Co. has recently purchased two 1000 K.W. Westinghouse alternating current generators, which will be direct connected to water wheels and used to supply power to Grass Valley, Nevada City, Sacramento and adjacent California towns. This is the third station to be installed by the company, two other stations having now been in operation for a number of years. The Central California Electric Co.'s system is a part of that of the South Yuba Water Co., which controls 400 miles of main ditch line in the Sierra Nevadas.

THE Crocker-Wheeler Co. of Ampere, N. J., manufacturers of direct current machinery, have included the following among recent orders: Standard Steel Works, Burnham, Pa., two, size 224, 200 K.W. generators; James Cooper Mfg. Co., Montreal, Canada, 55 K.W. generator; Buda Foundry & Mfg. Co., Harvey, Ill., size 280, 240 K.W. generator; Whitehall Portland Cement Co., Cementon, Pa., 85 H. P. motor; Woodward & Lothrop, Washington, D. C., size 224, 200 K.W. generator; two, size 168, 150 K.W. generators; size 84, 75 K.W. generator; Sparrell Print, Boston, Mass., fourteen motors, 3 to 10 H. P.; Tidewater Steel Co., Chester, Pa., size 280, 250 K.W. generator; Minot Light & Telephone Co., Minot, N. D., size 100-D, 90 K.W. generator; Armour & Co., East St. Louis, Ill., four 50 H. P. motors; one 75 H. P. motor; Green Engine & Machine Co., Harrison, N. J., four 35 H. P. motors; Descubridora Mining & Smelting Co., Mexico, four 20 H. P. motors; Moline Malleable Iron Co., St. Charles, Ill., size 100-D, 95 K.W. generator; eleven motors aggregating 125 H. P.; Pennsylvania Sugar Refinery, Philadelphia, Pa., fourteen motors, 3 to 15 H. P.; Fretz Umbrella Works, Philadelphia, Pa., eighty motors in small sizes; Lake Shore & Michigan Southern Shops, Collinwood, Ohio, eleven motors aggregating 200 H. P. were shipped to apply on the installation in this plant; speed control will be obtained by the Crocker-Wheeler system of multiple-voltage operation.

Recently Declared Mining Dividends.

Daly-West, Utah, \$108,000.....	July 15
Mary McKinney G. M. Co., Colorado, \$30,000.....	July 15
Ontario, Utah, \$45,000.....	Sept. 20

Payable.

Latest Market Reports.

SAN FRANCISCO, July 11, 1902.

METALS.

SILVER.—Per oz., Troy: London, 24½d (standard ounce, 925 fine); New York, bar silver, 52½c, refined (1000 fine); San Francisco, 52½c; Mexican dollars, 44½c San Francisco, 42c New York.

COPPER.—New York: Standard, \$11.37@11.75; Lake, 1 to 3 casks, \$11.95; carload lots, \$12.15; Electrolytic, 1 to 3 casks, \$11.95; carload lots, \$11.60; Casting, 1 to 3 casks, \$11.75; carload lots, \$11.50. San Francisco: \$14.00. Mill copper plates, \$17.00; bars, 18@24c. London: £52 17s 6d spot, per ton.

LEAD.—New York, \$4.12½; Salt Lake City, \$3.60; St. Louis, \$4.00; San Francisco, \$4.50, carload lots, 4½c 1000 to 4000 lbs.; pipe 5½, sheet 6, bar 5½; pig, \$4.75. London: £11 6s 3d per ton.

SPELTER.—New York, \$5.00; St. Louis, \$4.50; London, \$19 per ton; San Francisco, ton lots, 5½c; 100-lb lots, 6½c.

ANTIMONY.—New York, Cookson's, 10c; Hallett's, 8½c; San Francisco, 1000-lb. lots, 10c; 300 to 500 lbs., 11c; 100-lb. lots, 13@15c.

TIN.—New York, pig, \$28.50; San Francisco, ton lots, 31½c; 1000 lbs., 31½c; 500 lbs., 31½c; 200 lbs., 32c; less, 32½c; bar tin, 3½, 37c. London, £126 15s spot.

PLATINUM.—San Francisco, crude, \$17.50 ½ oz.; New York, \$19.50 per Troy oz.

QUICKSILVER.—New York, \$48.00 large lots; London, £8 15s; San Francisco, local, \$46.00 ½ flask of 76½ lbs.; Denver, \$50.00. Export, \$43.50.

BABBITT METAL.—San Francisco, No. 1, 10c.

ALUMINUM.—New York, No. 1, 99% pure ingots, 35c; No. 2, 90%, 30c to 35c.

SOLDER.—Half-and-half, 100-lb. lots, 20c; San Francisco, Plumbers', 100-lb. lots, 16½c.

NICKEL.—New York, 50@60c ½ lb.

STRUCTURAL MATERIALS.

IRON.—Pittsburg, Bessemer pig, \$21.50; gray forge, \$21.00; San Francisco, bar, 3c ½ lb., 3½c in small quantities.

STEEL.—Bessemer billets, Pittsburg, \$33 and \$34; open hearth billets, \$35.25; San Francisco, bar, 7c to 12c per lb.

CHICAGO CURRENT QUOTATIONS.

Bessemer.....	\$23.50@24.00
Foundry Northern 1.....	21.50@23.00
Northern 2.....	21.00@22.50
Northern 3.....	20.50@22.00
Southern 1.....	21.15@22.15
Southern 2.....	20.65@22.15
Southern 3.....	19.65@20.65
Forge.....	19.15@20.65
Charcoal.....	23.00@24.50
Billets, Bessemer.....	33.00@34.00
Bars, iron.....	1.80@ 1.90
Bars, steel.....	1.75@ 1.85
Rails, standard.....	28.00@30.00
Rails, light.....	34.00@40.00
Plates, boiler.....	1.90@ 2.00
Tank.....	1.75@ 1.80
Sheets, 26 store.....	3.25@ 3.40
No. 27.....	3.35@ 3.50
No. 28.....	3.45@ 3.60
Angles.....	1.75@ —
Beams.....	1.75@ —
Tees.....	1.80@ —
Zees.....	1.75@ —
Channels.....	1.75@ —
Steel melting scrap.....	19.00@20.00
No. 1 railroad wrought.....	21.00@22.00
No. 1 cast, net ton.....	15.00@15.50
Iron rails.....	24.00@25.00
Car wheels.....	21.00@22.00
Cast borings.....	9.50@10.00
Turnings.....	13.50@14.00

CEMENT.—Germania, \$2.65; K. B. & S., \$2.65; Hewmoor, \$2.50; Trowell, \$2.50 per bbl.

LIME.—Santa Cruz, \$1.60; Roche Harbor, \$1.60 per bbl.

LUMBER.—(Retail): Pine, ordinary sizes, \$19.50@22.00; extra sizes higher; redwood, \$21.50@22.00; lath, 4 feet, \$4.00 @4.25; pickets, \$19.50; shingles, \$2.35 for No. 1 and \$2.00 for No. 2; shakes, \$13.50 for split and \$14.50 for sawed; rustic, \$26.00 @32.00.

GENERAL SUPPLIES.

POWDER.—F. o. b. San Francisco: No. 1, 70% nitro-glycerine, per lb., in carload lots, 15½c; less than one ton, 17c. No. 1*, 60%, carload lots, 13½c; less than one ton, 15c. No. 1** 50%, carload lots, 11½c; less than one ton, 13c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2* 35%, carload lots, 9½c; less than one ton, 11c. No. 2** 30% carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 728 kegs, \$1.50 per keg; less car lots, \$2 per keg.

CAPS.—3x, \$5.50 per 1000; 4x, \$6.50; 5x, \$8; Lion, \$9, in lots not less than 1000.

FUSE.—Triple tape, \$3.60 per 1000 feet; double tape, \$3.00; single tape, \$2.65; Hemp, \$2.10; Cement No. 2, \$3.00; Cement No. 1, \$2.65, in lots of 3000 feet and up.

CANDLES.—Granite 6s, 16 oz., 40s., 10c ½ set; 14oz., 40s., 9c.

COAL.—San Francisco, coast, yard prices: Wellington, \$3; Seattle, \$6.50; Coos Bay, \$5.50; Southfield, \$5.00. Cargo lots, Eastern and foreign: Wallsend, \$7.50; Brymbo, \$7.50; Pennsylvania, hd., \$14.00; Scotch, \$8; Cumberland, \$12; Cannel, \$11; Welsh Anthracite, \$14.00; Rock Springs, \$8.50, long ton, Colorado Anthracite, \$14.00. Coke, \$14 per ton in bulk, \$16 in sacks; Sunnyside, \$11.50, long ton.

CHEMICALS.—Cyanide of potassium, 98%—99%, jobbing, 27@28c ½ lb.; carloads, 25@26c; in 10-lb. tins, 38c; sulphuric acid, in carboys, 66% B, 2c ½ lb.; soda ash, \$1.90 ½ 100 lbs.; hyposulphite of soda, 2½@3c ½ lb.; blue vitriol, 5½@6½c ½ lb.; borax, concentrated, 7@8c ½ lb.; chlorate of potash, 12@13c; red sulphur, 5c; alum, \$2.00@2.25; flour sulphur, French, 2½@2c; California refined, 1½@2c; nitric acid, in carboys, 8c ½ lb.; caustic soda, in drums, 3@4c ½ lb.; Cal. s. soda, bbls., \$1.25 @1.50 ½ 100 lbs.; sks., \$1.05; chloride of lime, spot, \$2.50@2.60; nitrate of potash, in bbls., 8c; caustic potash, 10c in 40-lb. tins.

OILS.—Linedseed, boiled, bbl., 73c; cs., 78c; raw, bbl., 71c; cs., 76c; lots of 5 bbls., 1c less; Lucol oil, boiled, bbl., 64c; cs., 70c; raw, bbl., 62c; cs., 67c. Kerosene—Pearl, per gal., 20c; Astral, 20c; Star, 20c; Extra Star, 24c; Eocene, 25c; Elaine, 22c; Water White, in bulk, 13½c; Mineral Seal, iron bbls., 19c; wooden bbls., 22½c; cs., 25c; Mineral Sperm, cs., 26½c; Deodorized Stove Gasoline, bulk, 16c; do., cs., 21½c; 86° Gasoline, bulk, 20c; do., cs., 26½c; 63° Naphtha or Benzine, deodorized, in bulk, per gal., 14½c; do., in cs., 21c; Lard Oil, No. 1 bbl., 60c; cs., 65c; Neatsfoot Oil, bbl., 70c; cs., 75c; No. 1 bbl., 52½@55c; cs., 57½@60c; Sperm, crude, 60c; Natural White, 65c; Bleached do, 70c; Whale Oil, cs., 55c.

WHITE LEAD.—Per lb., in kegs: Five tons and over at one purchase, per lb., 6½c; 1 ton and less than 5 tons, per lb., 6½c; 500 lbs. and less than 1 ton, per lb., 7c; less than 500 lbs., per lb., 7½c; in 25-lb. tin pails, ½c per lb. above keg price; in 1 and 5 lb. tin cans, 100 lbs. per case, 2½c per lb. above keg price. Dry Lead—in bbls., 1 ton and over, 6c; do. in kegs, 6½c.

RED LEAD AND LITHARGE.—One ton and over at one purchase, per lb., 7c; 500 lbs. and less than 1 ton, per lb., 7½c; less than 500 lbs., 7c.

ASSAY LITHARGE.—Per lb., 8½c.

BISMUTH.—Subnitrate, per lb., \$1.60.

BONE ASH.—4c ½ lb.

BORAX.—Crystal, 7c; calcined, 25c.

CHROMIUM.—(90% and over) per lb., \$1.25.

COPPER.—Carbonate, 20c; Red oxide, ½ lb., 60c.

MAGNESIUM.—Per lb., \$3.00.

MANGANESE.—(90% and over) ½ lb., \$1.25.

MERCURY.—Bichloride, ½ lb., 90c.

MOLYBDENUM.—25c. ½ gramme; 1000 grammes—2½ lbs.

PHOSPHORUS.—(American) ½ lb., 80c.

SILVER.—Chloride, ½ oz., 75c; nitrate, 55c.

SODIUM.—Metal, ½ lb., \$1.00.

URANIUM.—Oxide, ½ lb., \$3.50.

ZINC.—Metallic, chemically pure, ½ lb., 50c.

ZINC.—Dust, ½ lb., 10c.

ZINC.—Sulphate, ½ lb., .04c.

(These prices are wholesale, f. o. b. San Francisco, unless otherwise noted.)

New Patents.

Dewey, Strong & Co.'s Scientific Press Patent Agency, 330 Market St., S. F., has official reports of the following U. S. patents issued to Pacific coast inventors:

703,751.—GARMENT—W. P. C. Adams, Olympia, Wash.	703,877.—FRUIT GRADER—W. C. Anderson, San Jose, Cal.
703,891.—LOO REOISTER—W. B. Armstrong, S. F.	703,519.—RACKET—A. Becker, Seattle, Wash.
703,515.—TIE PLATING MACHINE—G. L. Bender, Los Angeles, Cal.	703,952.—CAPPING MACHINE—L. J. Borie, S. F.
703,533.—KILN—Butler & Kunze, S. F.	703,782.—VENTILATOR—Carpenter & Baker, Los Angeles, Cal.
703,694.—AMALGAMATOR—J. V. Coleman, S. F.	703,658.—PUZZLE—F. De Ford, Pasadena, Cal.
703,781.—SALES BOOK—C. E. Frisbie, Oakland, Cal.	703,571.—FLOW—A. K. Goodrich, S. F.
703,916.—FRUIT CLEANER—J. T. Haley, Alhambra, Cal.	703,927.—LOOK—C. S. Huntington, Los Angeles, Cal.
703,847.—COMB CLEANER—S. L. Kietter, Los Angeles, Cal.	703,706.—OIL BURNER—A. S. Meyer, S. F.
703,443.—SPIKE PULLER—N. F. Murphy, Bakersfield, Cal.	703,817.—DREDGER—R. A. Perry, S. F.
703,471.—ORE CRUSHER—A. J. Petter, S. F.	703,853.—BILL CARRYING DEVICE—A. W. Thierkoff, Redding, Cal.
703,824.—OIL FEEDER—C. Q. Quinn, Port Costa, Cal.	703,819.—SASH HOLDER—W. M. Reedy, Spokane, Wash.
703,742.—CLOTHES HOOK—C. Salmond, S. F.	703,852.—CORSET—Nettle Temple, Stockton, Cal.
703,853.—BILL CARRYING DEVICE—A. W. Thierkoff, Redding, Cal.	703,875.—STORAGE BATTERIES—W. E. Winship, S. F.
703,877.—GATE—B. Wolverton, Portland, Or.	

Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

THRESHING MACHINES.—No. 703,061. June 24, 1902. G. W. Heinke, Stockton, Cal., assigned to Houser & Haines Mfg. Co. of same place. This invention relates to improvements in that class of machines known as "combined harvesters," in which a threshing machine is mounted upon bearing and steering wheels and has a header attachment projecting from one side by which the grain is cut, means for transmitting the grain and delivering it to a feed mechanism upon the threshing machine, which in turn, supplies the threshing cylinder, and means in the rear of said cylinder for transporting and separating the straw, grain and chaff; this mechanism all being driven by power derived from the rotation of the bearing wheels of the threshing machine as it travels over the ground.

ACTIVE MATERIAL FOR STORAGE BATTERIES, AND PROCESS OF MAKING SAME.—No. 703,375. July 1, 1902. W. E. Winship, San Francisco, Cal. This invention consists essentially in the electrolytic reduction of a suitable lead salt in a forming bath under the following conditions: That the said salt be formed in a mass by a process so that it shall not disintegrate on immersion in the forming bath; that the lead salt be soluble in the forming bath, but not to the extent that the form of the mass (in the shape of plates or other configuration) is altered; that the combination of lead salt and forming bath is such that with a suitable current density the previously amorphous mass of lead salt is transformed into an spongy lead consisting of a mass of threads of lead (technically known as "lead trees") which are generally parallel to each other and perpendicular to the exposed surfaces and which occupy the volume of the untransformed mass. It is further desirable that the untransformed mass have at least a slight superficial conductivity, so thereby the mass of lead trees is more uniform through its volume.

UMBRELLA DRIP CUP.—No. 703,323. July 1, 1902. P. W. Pray, San Francisco, Cal. This invention is adapted to catch and hold the drip from an umbrella when the latter is held in the hand. It consists of a hinged mouth adapted to pass over the end of the rod, said receptacle having an annular series of inwardly and downwardly projecting spring members, said members curving outwardly at their ends and adapted to bear against the rod on all sides and retain the receptacle or cup in position.

FRUIT GRADER.—No. 703,887. July 1, 1902. W. C. Anderson, San Jose, Cal. Assigned to Anderson-Barngrover Mfg. Co., San Jose, Cal. This invention is particularly designed for the separation of fruit from the various grades which are recognized as standard upon the market, and is adapted to provide a machine of the greatest capacity and efficiency, which is adapted to the combination in a fruit grading and classifying apparatus of grading screens, fixed, downwardly divergent, transversely disposed surfaces centrally beneath the screens, transverse hinged dividers co-acting with said surfaces to mingle or divert the products of contiguous screens; longitudinally arranged bins and longitudinally hinged sliding boards, turnable to receive the banded product and divert it to the bins on either side.

DREDGER.—No. 703,817. July 1, 1902. R. A. Perry, San Francisco, Cal. One-half assigned to Atlantic, Gulf & Pacific Co. of New York and San Francisco. This invention is especially designed for excavating material which is submerged beneath water. It consists in a mechanism by which the excavation is produced by a forward reciprocating movement in the line of the boat and apparatus, and the corresponding extension of the conveying pipes, and mechanism for retracting the apparatus after the forward movement has been completed, placing it to make another cut parallel with the first, whereby a series of cuts are made radially outward from a fixed point exterior to and at the rear of the dredge boat. It also comprises means for advancing the fixed center and bringing it up to the rear of the dredge boat after a complete cut has been made so as to place the apparatus in position for another forward cut. Other parts and details are included, and described in the specification.

MECHANICAL BILL-CARRYING APPARATUS.—No. 703,853. July 1, 1902. A. W. Thierkoff, Redding, Cal. This invention is designed for the convenient carrying of bills. It consists of a disk, drum or other support for holding bills with offset and hinged spring-pressed holding plates hinged thereto, forming essentially a continuation of the surfaces, the free edges of the plates acting to hold sets of bills in such a manner that they can be easily exposed for inspection. This invention obviates the necessity of clamping wires passing over the tops of the bills and which take up considerable room.

MANIFOLDING SALES DEVICES.—No. 703,781. July 1, 1902. C. E. Frisbie, Oakland, Cal. The object of this invention is to provide a book of simple construction capable of being carried in the pocket of the salesman, a book in which the pages are not likely to become soiled by contact with the carbon as the leaves are drawn out and in which the original and duplicate checks may be torn off separately and simultaneously. It consists of a case partially opened at one end, means for inserting the paper folded or rolled in one or more sheets within the case, a guide by which the direction of the paper may be changed and directed over the top of the case, arms independently movable, but having hinged reference to each other, whereby the paper is held taut on the top of the case and the carbon normally supported out of contact with the paper, a knife by which the sheets of paper may be torn off, and a flexible inclosure for the case.

WANTED.

Wanted to Bond a Dry Placer Claim, One Rich in Flour Gold.

Must be a dry proposition. Address "Placer Claim," care this office.

WANTED.

Consulting Mining Engineer, familiar with making examinations of mines, prospects and mineral lands. Address stating experience and references. Moderate salary to start, with advancement to competent man. Position permanent if found satisfactory. Address A. care of Mining and Scientific Press.

SITUATIONS WANTED.

Practical and technical mine superintendent ten years' experience in Pacific Coast mines. Assayer, millman and construction engineer. Local references. Address "Mineral," care this office.

WANTED.—Position as Assayer and Bookkeeper in a mine; experienced in underground work; good references; present position not desirable. Address Box No. 127, care of this office.

WANTED.—Position by a technical graduate. Am an experienced stamp and cyanide millman, good assayer and chemist. U. S. deputy mineral surveyor. Can handle any kind of a mill or mine. Address Technical, care of this office.

ASSAYER, familiar with cyanide practice, desires position as assayer, or in some capacity, in stamp mill. Address X, care of Mining and Scientific Press.

PHYSICIAN AND SURGEON with three years' experience in both emergency and general hospital, in addition to experience in mines and private practice, wishes position in a mine. Best of references. Address Box 123, care of this office.

PRACTICAL MILLMAN—AMALGAMATOR, Cyanide Man and Assayer, wishes position School of Mines graduate. Best references. Address R. B., care of Mining and Scientific Press.

CHEMIST AND ASSAYER, WITH TWENTY years' experience in mill and smelter work. Can run same. Address A. C., care of Mining and Scientific Press.

MINING ENGINEER, practical miner and mill man, assayer, etc., desires position of superintendent or assistant manager of a big property. Eleven years' experience. Best references. Now working in southern California. Address A. M. P., care of Mining and Scientific Press.

Cyanide and Stamp Mill Superintendent open for engagement after September 1st. Graduate. A thorough assayer and chemist; also accountant. Speaks Spanish. Will go anywhere. Specialty, construction; also successful in assaying low grade and slimy ores. References "A. I." Address Practical, care of Mining and Scientific Press.

WANTED.—SITUATION AFTER MARCH 15, 1902, as Manager or Superintendent of mine. Have had five years' experience in manufacturing and constructing mining machinery and plants. Three years' experience in underground work. Four years' experience as manager and superintendent. Treatment of low grade ores a specialty. Practical in every detail. State location of mine and salary. Best of references. Address X. Y. Z., this office.

A technically educated Mining Engineer, at present employed as assayer, wishes position of one of the largest corporations in Mexico, desires a change of position to the United States about July 1st. Has had 18 years' successful experience as engineer and superintendent, never having made a failure; 36 years of age; strictly temperate; a skilled designer, geologist and metallurgist, and a practical miner, as well as a hard worker and thorough and experienced. References of the highest order, including present employers. Address Supt., care this office.

FOR SALE.

CALIFORNIA RICH GRAVEL GOLD MINE.

Equipped with bulldozers, tools, etc. Lower tunnel now running. No prospect. Small amount of treasury stock for sale to complete the mine. Best of reports by leading experts. Land patented. No encumbrance. This is a snap. Write for prospectus.

E. S. ARMSTRONG, Room 313 Chamber of Commerce Bldg., Chicago.

Gold Mining Properties For Sale.

Two First-Class Placer Mines, one having 20 years' record as a producer. Both in good working condition. Terms reasonable. Address "Enquire," care this office.

The Mines Exchange, Ltd.

Mines and prospects in British Columbia, the Western States, and Mexico, for sale. Free milling gold properties a specialty. Write us for reports and information. Bank references given. Address THE MINES EXCHANGE, LTD., P. O. Box 700, Nelson, B. C. Branch Office: P. O. Box 584, Salmon City, Idaho.

DELINQUENT SALE NOTICE.

REWARD GOLD MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Pine Grove, Amador County, California.

Notice.—There are delinquent upon the following described stock, on account of assessment (No. 10) levied on the 23rd day of May, 1902, the following amounts set opposite the names of the respective shareholders, as follows:

Name.	No. Oert.	No. Shares.	Amt.
Fraser, J. P.	147	1,000	\$20.00
Fraser, J. P.	105	500	10.00
Stadfeld, J. Jr., Trustee.	91	500	10.00
Stadfeld, J. Jr., Trustee.	92	500	10.00
Stadfeld, J. Jr., Trustee.	93	500	10.00
Stadfeld, J. Jr., Trustee.	94	500	10.00
Stadfeld, J. Jr., Trustee.	95	500	10.00
Stadfeld, J. Jr., Trustee.	96	400	8.00
Stadfeld, J. Jr., Trustee.	141	300	6.00
Stadfeld, J. Jr., Trustee.	142	200	4.00
Stadfeld, J. Jr., Trustee.	233	1,000	20.00
Winterberg, W.	164	5,000	100.00

And in accordance with law, and an order from the Board of Directors, made on the 23rd day of May, 1902, so many shares of each parcel of such stock as may be necessary, will be sold at public auction, at the office of the company, Room 58, No. 309 Montgomery street, San Francisco, California, on MONDAY, the 21st day of July, 1902, at the hour of 11 o'clock A. M. of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of sale.

J. STADTFELD JR., Secretary. Office—Room 58, No. 309 Montgomery street, San Francisco, California

MINING AND SCIENTIFIC PRESS

Whole No. 2191.—VOLUME LXXXV.
Number 3.

SAN FRANCISCO, CAL., SATURDAY, JULY 19, 1902.

THREE DOLLARS PER ANNUM.
Single Copies, Ten Cents.

Forms of Copper Ore.

Carbonates and oxides of copper, green, blue, red and black ores, are always found above the water line. The red oxide when pure carries 88% copper; the black oxide 78%; the carbonates (green and blue ores) 70%; but all those when taken out in considerable quantities contain impurities that lessen the percentage of copper from one-third to one-half. The red oxide frequently has a small core of native or metallic copper, and the red oxide surrounds this core. Below the water line, and often above, sulphurets of copper are found, generally a yellow sulphuret—chalcocopyrite; when pure this ore of copper carries 35% copper and 30% iron, but usually owing to impurities, the average does not exceed 10% to 15% when the ore is taken out in quantity. The richest ore of copper being found within a few hundred feet of the surface, a copper prospect where there is a fair market for copper ores, is a poor man's mine until the water line is reached, but to make it profitable careful assorting is necessary; no ore is more likely to deceive an inexperienced miner in assorting than copper ore. The ores of copper almost universally were originally sulphurets, above the water line as well as below, especially near the surface the sulphurets have oxidized, becoming in the first instance sulphates. The sulphates are soluble in water and the waters at and near the surface have dissolved a part of the sulphates and carried them into all the little seams and even into the body of adjacent rocks, coloring them with the beautiful green and blue common to carbonate copper ore; the smallest possible amount of sulphate of copper sufficient to color a considerable quantity of the adjacent rocks. After the coloring matter had penetrated in this way into adjoining rocks, nature, in its mysterious alchemy, changed the sulphate into a carbonate containing only a small percentage of copper, and an amateur finding large quantities of this highly colored rock near the surface may imagine himself the owner of a large and valuable lode of copper. In assorting, therefore, in order to make copper mining profitable, great care and judgment must be used in separating the really valuable ore from the highly colored valueless stuff.

The influence and potency of mining is notable in the growth of the iron and steel industry of this country. It is customary to ascribe such success to the tariff. But the mining engineer and metallurgist

is the real creator. Cheap production of iron through modern mining methods and cheap manufacture of steel by modern metallurgists, coupled with low transportation charges and automatic machinery, are what has made and maintained the great iron and steel industry of this country. The protective tariff is a secondary feature.

The British Columbia Government has before it a bill providing for compulsory arbitration. The Leg-

The Ajax Mine, Victor, Colo.

On page 35 appears an engraving of the shaft house and buildings of the Ajax Gold Mining Co., Victor, Colo. This property is equipped with fine machinery. They have a double flat rope hoist capable of hoisting 2000 feet, cross-compound air compressor large enough to operate thirty-six air drills, water tube boilers aggregating 1135 H. P., electric light plant sufficiently large for running 650 lamps, four electric motors, complete electric signaling system throughout the mine. A machine shop complete in every detail is operated by electricity. The self-supporting steel stack is 135 feet high. A three-compartment shaft 1000 feet deep is on this property. There are ten ore bins 125 feet long, 60 feet high, holding in the neighborhood of 1000 tons of ore. The waste from the ore house is run through a washer and good values are saved from the ore. The ore is taken from the bins and elevated 57 feet by means of Link Belt Machinery Co.'s car haul (this is the only chain car haul of its kind in the district) and dumped into cars for shipment to the United States Reduction & Refining Co.'s plant at Colorado City for treatment. All the ore is shipped via the Colorado Springs & Cripple Creek District Railway, which is controlled by the mine owners. About 200 men are steadily employed at this mine.

The engraving on this page shows two double-deck cages at the mine, six men on each deck.

CALIFORNIA county boards of Supervisors are appropriating considerable money for descriptive literature showing the advantage of stock, wheat, vegetable and fruit raising. This is commendable, but to a miner it looks a little funny sometimes. There is naturally keen competition among producers of food products. Every additional producer tends to make his particular kind of product proportionately cheaper

and the men now in that business are taxed to induce additional competition. In the case of the gold miner he is a good customer of all producers and a competitor of none, and it makes no difference how many more mines alongside him the mint will continue to pay \$20.67 per ounce for his product. No county in California is spending a cent to thus advertise its mining attractions, and the only satisfaction to the miner in the present preaching of the gospel is that the more farmers and fruit raisers the more of their products he can buy for the gold he produces. Incidentally, the miner is considered able to take care of himself.



MINING AND SCIENTIFIC PRESS.

Large Scene, Ajax Mine.
Flashlight Photo.
—By A.E. Masters.

Double Deck Cages at the Ajax Mine, Victor, Colo.

islature of British Columbia has a reputation for unwise and hasty legislation in respect to the mining industry, and any further legislation along these lines may be misconstrued. "Compulsory arbitration" sounds well in theory, but in practice would be a curious experiment on this continent. True, it is claimed to work satisfactorily in New Zealand and New South Wales, but under totally different conditions. Arbitration is always advisable, but to compel it takes away the very principle of arbitration which implies voluntary agreement by both parties in dispute to have the controversy determined by some third party.

MINING AND SCIENTIFIC PRESS.

ESTABLISHED 1860.

Published Every Saturday at 350 Market St., San Francisco, Cal.

TELEPHONE, DAVIS 771.

ANNUAL SUBSCRIPTION:

United States, Mexico and Canada.....\$5 00
All Other Countries in the Postal Union.....5 00

Entered at the San Francisco Postoffice as second-class mail matter.

Chicago Office (Telephone, Harrison 73).....737 Monadnock Block.
Denver Office (Telephone, Olive 733).....606 Mack Block.

J. F. HALLORAN.....Publisher.

San Francisco, July 19, 1902.

TABLE OF CONTENTS.

ILLUSTRATIONS.—Double Deck Cages at the Ajax Mine, Victor, Colo., 30. "G. M." Drill for Deep Holes; "D. M." Drill, Screw Feed; "E. M." Drill, Hydraulic Feed, 31. Shaft House and Buildings, Ajax Mine, Victor, Colo.; Aladdin Reading Lens, 35. Taylor & Brunton Sampler, Goldfield, Colo., 36. Mining and Metallurgical Patents, 37.

EDITORIAL.—Forms of Copper Ore; Influence and Potency of Mining; A Bill for Compulsory Arbitration; The Ajax Mine, Victor, Colo.; Appropriating Money for Descriptive Literature, 30. Location Dispute Questions; Convention of the United Mine Workers; Inducing Investment; Books and Serials; Returning Prosperity to the Rand Region, 31.

MINING SUMMARY.—38-39-40.

LATEST MARKET REPORTS.—41.

MISCELLANEOUS.—Concentrates, 32. Extraction of Gold by Chlorobromination (C. Grollet's Process), 33. A New Line of Diamond Drills; Chemical-Metallurgical Notes, 34. Hoisting Works for Deep Mines; Hydraulic Mining Costs; Aladdin Reading Lens, 35. Taylor & Brunton Sampler, Goldfield, Colo.; Liquid Fuel—Boiler Firing With Oil; A New Form of Cupel, 36. Mining and Metallurgical Patents, 37. Personal; Commercial Paragraphs; Recently Decided Mining Dividends; New Patents; Notices of Recent Patents; Obituary, 41.

It is not easy to correctly answer the numerous location dispute questions that come, for even if a court decision he cited in support of an assertion, another decision can sometimes be quoted overruling the former one. Where A locates a claim, fails to do the required \$100 work for the current year, but resumes work after his claim has expired, though before any other person has made a location thereon, A certainly has the only good "title." For though B may "locate" the claim subsequent to A's resumption of work, B acquires no rights thereby. In this regard it is to be borne in mind that the annual assessment required by law is not to keep alive the title to the claim, but to prevent it from collapsing. It makes no difference whether the annual work for the year in question was done or not, so long as the locator had asserted his rights in the following year before any attempt had been made to relocate the claim. That is: If a man does not do the required amount of work in a given year, his claim has lapsed. If, however, he begins work on the claim during the following year, before another location has intervened, he re-establishes his rights, his location being practically an original location, and no other locator can obtain title by going back to any lapse of which he has not taken advantage in time. Meanwhile, if a locator fails to perform the necessary assessment work, he takes the risk of losing his claim. Such a claim is jumpable under the law. Five dollars' worth of work would do if possession was not disputed, while \$99 worth would not be enough if the claim were jumped before the resumption of work in the following year.

THE president of the United Mine Workers has announced a general convention to be held on the 17th inst., at which it is stated that an effort will be made to abrogate existing contracts or agreements under which hituminous coal miners are now working. There is so much personal and political effort and so much business competition mixed up in these disputes between coal miners and operators that it is sometimes difficult to determine the exact facts. But whatever the rights or wrongs of coal miners or owners one fact stands out prominently, viz.: No friend of the coal miner will advise him to commit a breach of contract which is a breach of faith. Business demands everywhere and at all times that a contract mutually agreed to and after due consideration formally accepted should be lived up to. This is not original nor a new discovery, but it is in occasional danger of being lost sight of. If the coal miners' organization refuses to be bound by its own obligations and agreements while seeking to hold the other side to its agreement, it will forfeit the right

to demand serious consideration of any such future arrangement. It is not a question of strikes or labor organizations. That was settled long ago. All labor anywhere and everywhere has the right to organize, to strike, to make demands and quit if such demands be denied. That is the unalterable and inalienable right of a worker in any capacity, but no one man or set of men are anywhere justified in setting aside the rules of business, and one of these rules is that a contract for a certain time should be faithfully kept by both parties thereto. To do otherwise is not honest, and whatever in business is not honest cannot stand. It appears that the miners themselves realize this, but that some of the ambitious leaders want to make personal capital out of their ability to persuade their followers that it is good business to break an agreement that they themselves proposed and which the other side is faithfully keeping. Such kind of work never wins, and even if it did success of that kind is always worse than failure.

Inducing Investment.

"We have a splendid mining district here and all that is required is capital to show how rich it is. Capital is needed to develop our many promising prospects." The above, hoiled down, is the gist of numerous letters weekly received at this office. They all read just about the same, and, doubtless, are mostly true. With some there is a sort of hurt feeling manifest, as though "capital" was to blame in ignoring that locality. "Capital" doubtless does miss many a good chance for investment, and when one sees the columns of fake mine schemes in Eastern papers, he thinks how much good money is fooled away on these swindles—money that could with great mutual profit develop deserving districts. But "capital" is not to be blamed for its neglect or refusal to invest, for, though in those days of big money looking for 4%, mining comes in for heavy investments, capital everywhere seeking business opportunity; yet as well seat one's self in a corner of a 40-acre lot with a pail between one's knees expecting a cow to break in and step up to be milked as to expect "capital" to invest in any mining district without sufficient inducement. The possession of mineral wealth is not enough. It should be made known. One good way is to help the local newspaper. This is an age of advertising, and the press is the best for announcement. Tell the local editor the truth, buy his paper and pay for it. What he says about your prospect, if it has the right ring to it, will be noted by the larger journals and thus get before "capital." When "capital" does get as far as your town, don't assume that it can be easily led. "Capital" is usually shy and you must secure its confidence. Tell the truth; the truth is good enough and most people believe it. Don't inflate prices. Let the buyer have a chance to make a little. True, the prospect may be worth \$100,000, but wouldn't it be better to take a little less than to hold out for your own figure. "Capital" is willing to take chances sometimes; but if it goes away, you may have to hang on to your \$100,000 property for some time, and may even die waiting. Twenty-five thousand is worth more to a live man than a \$100,000 prospect to a dead one. Then, too, if "capital," when it gets to your place, takes a fancy to some property other than yours, don't tell the visitor that he will be sold if he buys that, or that you can put him on to something better. Let your neighbor, friend or enemy, make a sale if he can. The next best thing to having money yourself is for some one else near you to have it. It would be even well for you to praise the other fellow's property a little—much better than to "knock" it. One investment, if satisfactory, leads to another, and the sale of your neighbor's property may help you to dispose of yours. Of one thing be sure: "Capital" will be ready to believe any mean things you may tell it, and will feel like taking the next stage out of the place, while a little broad gauge treatment may be the means of considerable resultant good to all concerned. Of course, you know all this already, without being told; you've heard it before, but yet we continue to quote what we cannot improve. This is homely, but true.

Many a mining camp of merit has been "queered" forever by the mistaken notion of its residents that a would-be investor who strays in there is a fit sub-

ject for imposition. While they cannot affect the existence of mineral in the ground if they keep men from going down after it, the result is the same as if the ore were annihilated. Millions of dollars of ore in the ground will never benefit its owner nor the community unless it is taken out, and the men who are able to go after the ore should be met fairly by the prospector or promoter to the mutual benefit of all. Prohibitive prices and misrepresentation never opened a mining camp.

Besides telling your local editor the true news and buying his paper, and showing in all ways that you appreciate his value, give him a little advertisement of your property. You won't lose anything by it. It were also well to take and carefully read a good mining paper. You will often see therein the names of men who are on the lookout for mining property; write them briefly, setting out in short meter what you think your local advantages are. Get your neighbors to make up a little purse and have some neat circulars printed; send those out to any address that may seem to you desirable; 99 out of every 100 may be wasted—circulars usually are—but one out of each hundred may start an inquiry. Just consider you have something to sell—that needs advertising, and advertise accordingly. The fact that you write to this paper as you do shows that you partly appreciate this fact—systematize the idea.

You cannot attract deserved attention except in some such way. It is just as good business to advertise the resources of a mining district or the merits of a particular property as to advertise a concentrator or a hoist. The idea is to make a sale and do business. There is an immense field, and one that needs cultivation. If you think you can't handle that kind of work, get some one whose business it is—some one in whom you have confidence—and pay him to do it for you. Tell him just how much you can spend and let him arrange accordingly. This does not exhaust the subject, being merely suggestive.

Books and Serials.

The mining and scientific advance is at present so rapid as to present the singular spectacle of discrediting some of its own recent literature. Books on mining or metallurgy are becoming less valuable than serial publications on the same subjects. As an illustration of this, an article in this journal in the May and June issues on smelting is in advance of any published bound volume on that point. This is not an unusual thing in the case of the MINING AND SCIENTIFIC PRESS, but is referred to as the most recent illustration of the fact noted.

Mining and metallurgy are progressing too fast for the makers or writers of books thereon to keep pace with the advance. A book on smelting or lixiviation published this month is out of date next month, because some invention or improvement in progress while the book was being written becomes a practical system and begins to be put in operation as the book begins to circulate. The real literature of the mining and metallurgy of to-day is found in the columns of such publications as this. This is not said in derogation of the admirable work of many distinguished miners and metallurgists, who have with commendable care and accuracy compiled valuable treatises thereon. To them great credit is due, and they have frequently been found to ably supplement current information by extended and patient preparation of material. The fact is that without any blame to them the march of invention is so swift that no writer of books, however competent or zealous, can keep up with such rapid development. Some day, perhaps, this "march of invention" may make a halt long enough to enable writers of books to catch up with the "present state of the art," but it does not look that way just now. The technical literature of the twentieth century is found in the current publications. The books partake more of the nature of reviews and verifications, and as such their value is not to be decried.

THE receipt at this office of the Journal of the Chemical and Metallurgical Society of South Africa is among the evidences of returning prosperity to the Rand region. The September, 1899, issue was stopped by the war, and since then there has been an interregnum, now happily removed.

Concentrates.

THE present annual world's output of lead is estimated to be about 1,000,000 tons.

A "LIGHTNING-ROD" is neither useful nor ornamental; its only value is to the seller.

FROM the first record in 1848 to Dec. 31, 1900, California's gold yield aggregates \$1,345,576,044.

A POUND of zinc in the shape used in cyanide precipitation exposes about 1500 square feet of surface.

THE lead production of the world for the year ending June 30, 1902, may be estimated, approximately, at 650,000 tons.

FOR results of experiments in treating titaniferous ores our correspondent might write to A. T. Rossi, 35 Broadway, New York City.

PINE or fir rifle blocks for sluices are apt to occasion loss of gold, because of the pitchy grease exuding therefrom, flourishing the quicksilver.

THE museum at the California State Mining Bureau, San Francisco, is considered by many to carry the finest mineral collection in the country.

THE letters "M. C. B." on some freight cars mean that that car's construction has been approved by the Master Car Builders' Association.

THE ordinary rule for proportional dimensions of mine post timbers is that the diameter of the post in inches should be equal to its length in feet.

STIBNITE, an antimony sulphide (Sb_2S_3), is the common ore of antimony, and the only one from which that metal is obtained in the United States.

THEORETICALLY, from an orifice 1 foot square at a depth of 20 feet there would be discharged in ten seconds 358.6 cubic feet, or 2682 gallons, water.

ALCOHOL has no effect upon copper, but if iron, tin, lead, zinc or galvanized iron be kept in continued contact with alcohol, an oxidized deposit will result.

OF ALL THE HEAVY METALS copper has the greatest affinity for sulphur. If both come in contact in a finely divided state, they combine at ordinary temperature.

IRON may be quickly and easily cleaned from rust by dipping in or washing with nitric acid one part, muriatic acid one part and water twelve parts. After using, wash with clean water.

THE principal present uses of aluminum are for electrical conductors, as deoxidizing agent in steel manufacture, for making bottle caps and boxes, for advertising novelties and toilet articles.

AT the Lincoln mine, Sutter Creek, Cal., the use of oil for fuel shows a saving of 30%; at the Onaida mine it is figured that oil at \$1.50 per barrel is equal in economic value to wood at \$4.50 per cord.

TO FORM a normal solution of sulphuric acid, add 98 milligrammes of the acid to a cubic centimeter of water. For caustic soda solution add 40 milligrammes of the sodic hydrate to a cubic centimeter of water.

IT is believed that the water problem at Leadville, Colo., can only be successfully solved by pumping, as the formation of the country makes it very difficult to drive any deep tunnel that would drain the whole district.

PLATINUM loses weight when heated in air and even more rapidly in oxygen. It is thought that the loss in weight is due to the chemical action of oxygen in attacking and removing certain elements from the platinum.

COMPANIES have incorporated at various times to build a steel tubular tunnel under San Francisco bay, but the ferries still do profitable business. The project is feasible and will be a reality before the close of the century.

THE standard length of steel rails used to be 28 and 30 feet. It is now 33 feet, owing to the increased length of the cars. Rails are made as long as 60 feet. The Santa Fe road runs steel box cars 40 feet long; weight (empty), 44,900 pounds.

THREE gallons per stamp per minute would be a fair allowance for a 10-stamp mill. Where water is scarce settling basins are economical. By such use the total amount of water required need not average over 500 gallons per ton of ore crushed.

TO RUN A DYNAMO with a gasoline engine is a little out of the ordinary line, but if the gas engine be provided with a heavy balance wheel, or a countershaft with a heavy pulley upon it, it probably could run steadily enough for such purpose.

PHOTOGRAPHS are now considered an essential part of a modern mining report, and the camera is coming into prominence in connection with mine workings. Its chief use is in photographing maps of mine workings, and, in general, a photographic record of construction work.

"LIMITED" in the title of a corporation means considerable to English companies. Under English law stockholders in a company not "limited" are individually liable for all the debts of the company; in a limited company their liability is limited to the amount of stock they own.

VANADIUM and the platinoid metals are occasionally found in the ashes of coal, notably in New South Wales. Some Australian coal has been shown by analysis to contain as much as 0.44% vanadium and 0.63% platinum metals. That is, one ton of such coal would yield 144

oz., 1 dwt., 3 gr. metallic vanadium and 20 oz., 13 dwt., 11 gr. platinum metals. Gold and copper have also been found in appreciable quantities in coal from the Lithgow colliery, New South Wales.

THE West African gold coast is a different proposition from the South African gold fields, being less productive and unhealthy. No one should think of going there except at a good salary guaranteed by responsible parties, and with a sound physique, to withstand disease and exposure.

EASTERN investors in mining stocks are not always favorably disposed to the "non-assessable" feature in proffered stock, realizing that it is often difficult to raise necessary funds on non-assessable stock, unless the officials of the company become personally responsible for the debt.

IN using nitric acid for parting there is likelihood of missing any possible platinum present. Bullion supposed to contain platinum should be cupelled at a higher temperature than gold or silver. With the use of sulphuric acid for parting the platinum is insoluble, remaining with the gold.

TO ASSAY zinc precipitates, 1-10 A. T. of the slimes thoroughly mixed with three times their weight of litharge is placed in a scorifier, covered with forty grams of lead and scorified as usual. The litharge oxidizes the zinc before it can volatilize, the reaction being $2\text{Zn} + \text{PbO}_2 = 2\text{ZnO} + \text{Pb}$.

UNDER present conditions the production of light without heat is as apparently impossible as in the last century. Of every 100 tons coal used at gas works or electric light stations about ninety-seven tons are (so far as the production of light is concerned) absolutely wasted in the production of useless heat.

THE California Debris Commission construes the meaning of the term "hydraulic mining" to be "mining by means of water under pressure through a nozzle." The Civil Code of California defines hydraulic mining to be "mining by means of the application of water under pressure through a nozzle against a natural bank."

LEAD POISONING in dry carbonate mines is not infrequent, the bad effects being largely due to the fact that lead, unlike other metals, tends to remain in the system, its bad effect being thus cumulative. As a preventive or antidote, perhaps, nothing is better than water for drinking, in each quart of which is two drops sulphuric acid.

IN obtaining a patent for a mining claim a mill which is situated on another claim cannot be credited to the first claim as improvement to establish the \$500 expenditure required by law as a condition precedent to patent. A mill, while an indirect benefit to a mining claim, is deemed of no direct benefit or aid to the actual development of the claim.

TO DETERMINE copper, iron or zinc in a cyanide solution, take from 500 to 1000 c.c. of solution, acidify with a slight excess of sulphuric acid, add six grams of pure acid sulphate of potassium, evaporate to dryness in a platinum dish and then heat to dull redness to melt the mass. The metals are obtained as sulphates and can be melted and estimated in the usual way.

THE Mining and Metallurgical Institute of London, England, annually awards a gold medal and premium of the value of \$250 to the author of the paper of highest merit contributed to its Transactions by any member of the Institute upon the mining, treatment, or reduction of gold ores. So far as "Concentrates" knows no similar award is so made by any association in this country.

CHROME ORE carrying 50% is commercially profitable if mined close to sources of demand; but as there is no import duty, and the Atlantic freights are but about \$3 per ton to New York, where most of the demand is, there is little incentive to mine it anywhere west of the Mississippi. It exists in plenty at various sections and at times has been produced in considerable quantities in California.

SEVERAL demurs have been received regarding the fifth concentrate in this column in the issue of the 28th ult., which read: "With the piston speed 100 feet per minute, and the plunger 4 inches diameter, a double-acting pump would discharge 76 2/3 gallons per minute." The item should have had the word "theoretically" attached. With 85% efficiency the actual practice would be 65.23.

A GOOD nickel-bronze alloy for steam fittings, etc., is: Copper, 70%; nickel, 20%; zinc, 10%. All the zinc and half the copper are melted together, then cast and reheated into small thin pieces. All the nickel is placed in the bottom of a crucible and then are added, alternately, layers of the copper-zinc alloy and the other half of the copper, and covered with charcoal. The resultant metal shrinks in cooling.

WHERE several claims lie in a group and are under one or joint ownership, the required annual assessment work may all be done on one claim, if the work so done is for the benefit of all claims. The notice of labor having been performed posted on the mine should state this fact, and a notice should be posted on each claim of the group making similar statement and setting forth where the assessment work has been done.

THE resistance of a wire varies inversely as its cross-sectional area. A wire three sizes smaller than a given wire will have a resistance twice as great, and a wire three sizes larger will have a resistance one-half as great,

as that of the given wire. The ratio between the resistance of any wire in the B. & S. gauge and that of next higher number is that of 1 to 1.26. The ratio between the resistance of any wire in the B. & S. gauge and that of the next lower number is that of 1.26 to 1.

TO prepare a paste for mounting purposes, mix three-quarters of an ounce of starch with a little water to form a smooth cream; pour on sufficient boiling water to make ten fluid ounces; soak half an ounce of glue in cold water until soft, pour off excess of water, melt the glue down by gentle heat and stir into the paste previously made; add one dram alum and four drops oil of cloves; stir well until dissolved. If the material should dry too hard, add two dm. glycerine.

SEVERAL places in California have produced gold finer than 978. One placer claim in Plumas county had gold 985 or \$20.36 per ounce; some from Vallecito, Calaveras county, runs 987 or \$20.42 per ounce; some from San Guiseppe, Tuolumne county, ran 998 or \$20.2305 per ounce. Pure gold is \$20.67. There is an extended chapter on this subject in the Souvenir volume of the California Miner's Association for the American Inst. M. E., page 175, written by Chas. G. Yale.

AS THE top of head-frame is not mentioned in the inquiry, it may be assumed that a vertical, two-post frame is contemplated, and that the axle of the sheave is about 40 feet above the collar of the shaft. In this event the center of the winding reel may be placed at a distance of 55 feet back of the center of the shaft—a 5-foot sheave being used. This is a convenient distance and does not necessitate a very long back brace. The resultant strain under these conditions would fall about 23 feet back of the center of the shaft, and the angle brace should be outside of this—in the direction of the reel—a short distance, 1 1/2 to 2 feet. If the back brace be placed in the line of strain back of the sheave, the angle brace would be about 40 feet in length. The position of hoisting reels with reference to a shaft is very often determined by the contour of the ground. The above suggestions are made on the assumption that the hoisting engine is placed on or near the level of the collar of the shaft.

THE introduction of superheated steam into engines largely influences the expansion of the heated parts. Engines always give great trouble when the distribution of the metal in the cylinders is not uniform, as parts with more metal expand most, and force the cylinder walls toward the inside and make the cylinder out of shape. Any kind of gun metal gets brittle after a short time, so that valves, seats, and all parts in direct contact with superheated steam, must be made of cast iron or other suitable mixture. Copper also loses about 40% of its strength at that temperature, consequently copper bends in pipes are not practicable. The best material for piping has proved to be wrought iron and steel, each pipe being as long as possible, to have the least number of flanges. For long, straight pipe connections, provision must be made to meet the expansion, which is, at 700° F., 0.0037 of the length, so that, for example, 100 feet of pipe extends 0.37 feet, or nearly 4 1/2 inches.

HIGH SPEED engines are usually considered those whose speed of revolution exceeds 200 per minute, while low speed engines seldom exceed 100 revolutions per minute. The length of the stroke is usually shorter in proportion to the diameter of the cylinder in the high speed engine than those of the low speed variety. The length of stroke in a high speed engine having a cylinder 12 inches in diameter will range anywhere from 10 to 16 inches, while in a low speed engine it will be from 24 to 36 inches. High speed engines are generally of the single valve pattern fitted with a flyball governor driven by a belt when of the throttling type, and with a shaft governor and direct connected positive action valve gear when of the automatic cut-off design. The low speed engines, with a few exceptions, employ four and six valves which are actuated by a releasing valve gear in some instances, and a direct connected gear in others. The governors are usually of the flyball type connected to the releasing or trip mechanism.

A MEXICAN PERTENENCIA is the equivalent of the American claim only in the term itself, the pertenencia being 100 meters square; it takes about eight pertenencias to correspond with the claim in the United States in superficial area. Any one can locate as many claims in one location in Mexico as he may desire. The lines of a claim extend down perpendicularly and not as in this country, and a prolific source of litigation in the United States is thus obviated in the southern Republic. Different prices rule in different districts for locating a claim. At Ures the cost is slightly over \$30; in Magdalena and some other districts it is \$40. After location the claim must be surveyed. This means bargaining with a surveyor for the best terms possible, but it usually costs from \$100 to \$300 to get the work done. Then \$10 a pertenencia, or claim, has to be paid for a title and \$2 stamps for the deed. When the title is delivered \$6 more is handed over in some districts. After this there is the yearly tax of \$10 for each pertenencia paid to the Government. Two claims wide and five long make a location 600 feet wide by 1650 feet long. On such a location the taxes would be \$200 a year. All the amounts quoted are in Mexican money. In American gold the amounts would be a little over one-half. The mining law of Mexico is a good one. There is room for amendment, however, for its provisions practically prohibit working on seams and small lodes, unless they are very rich. The small miner is hardly in evidence in Sonora, while in years past the product of his labor added materially to the country's mineral resources.

Extraction of Gold by Chlorobromuration (C. Grollet's Process).

The Grollet chlorobromuration process for the extraction of gold from its ores and from products containing it, consists in the simultaneous employment of chlorine and bromine, with the aid of pressure in certain conditions.

The chlorine is produced in the midst of the matter to be treated, and in the apparatus used for the purpose. The bromine may be introduced, either in the form of bromine, or in that of hydrobromic acid, or in that of any other bromine compound capable of giving bromine by its decomposition under the influence of suitable reagents. The reagents forming chlorine and bromine are introduced simultaneously in one lot or in several—preferably in two—lots, at the beginning and at the middle of the operation, which is thus divided into two phases. One of the characteristics of the process is the production, in the interior of the apparatus, of an excess of chlorine with a view to attain the object indicated subsequently. The quantities of chlorine and bromine necessary vary with the nature of the ore to be treated. The quantity of bromine is always too insignificant to render its recuperation advisable. It averages 200 grammes per ton of ore treated. The recuperation may always be done if economic conditions render it advantageous. The roasting of the substances to be treated is not always necessary with this process. It will, however, be shown subsequently that roasting is often necessary to recover with the gold all the other products that the ore contains. Engineers engaged in the metallurgy of gold have unfortunately paid too little attention to this important question. It is in this way that ores considered to be too poor to be treated advantageously, might be profitably worked.

It is well known that chlorine and bromine brought together may combine, giving two chlorides of bromine, the protochloride BrCl and the pentachloride BrCl_5 . The protochloride begins to dissociate at a temperature of about $+10^\circ \text{C}$., at a pressure of 700 millimetres, but this dissociation is not sufficiently intense for the chloride of bromine to exist at a higher temperature or even for it to be partially distilled. By the intervention of pressure the rapidity of this dissociation is diminished.

Bearing these principles in mind, the process is carried out in the following manner: Into the apparatus, preferably a rotating barrel, the reagents (products serving to form chlorine and bromine) are introduced, care being taken to add these reagents in such quantity that there is a large excess of chlorine. To the reagents a quantity of water is added, which varies according to the nature of the ores, so as to make the mass slightly liquid. At first, the nascent chlorine finds itself in the presence of the bromine; at this moment the nascent chlorine, endowed with a specially active power, acts on the gold in the ore. Moreover, the gaseous chlorine, in contact with bromine, forms chlorides of bromine, liquid compounds presenting all the signs of a dissociation becoming more stable under the influence of an increase of pressure. Now, and this is an important fact, chlorine in excess produces (in the interior of the apparatus and in addition to the pressure that may be furnished by the chlorine and bromine of the chloride of bromine entering into dissociation) a supplementary pressure, thanks to which the bromine combines with a part of the chlorine to form chlorides of bromine, BrCl and BrCl_5 . Consequently the chlorine acts on the gold which it dissolves, not only before it combines with the bromine, but even after this combination, since it is in great excess. In this last case, that is to say, when chlorides of bromine are formed in the interior of the apparatus, with excess of chlorine, the dissolving action of this excess of chlorine is effected, the result being that the pressure in the apparatus is diminished. With the decrease of pressure, the chlorides of bromine dissociate, which results in the production of chlorine and bromine in the nascent state, the chlorine being always in excess; and consequently there is increase of pressure, formation of chlorides of bromine, and dissolution of a new quantity of gold by the free chlorine resulting in a new diminution of pressure, and so on until all the gold is dissolved.

This play of combinations and of decompositions, the key of which is in the chlorine in excess, then in the increases and decreases of pressure, is, moreover, susceptible of being produced by special arrangements, thanks to which these results may be obtained. It is the regeneration of the chlorides of bromine, which renders it possible to employ so small a quantity of bromine, an average of 200 grammes per ton of ore treated. The attack on the gold being completed, the ore is conducted into a filtering tank, or the filtration may be effected in the barrel itself if the latter is furnished with an interior filter. It is then submitted to methodical washings with water, washings which are intended to extract completely the chloride of gold formed. The filtered liquid is then conducted, by the intermediary of a special tank, known as an exhaust tank, into the precipitation apparatus. The gold is precipitated by any process, but preferably by sulphurous acid and sulphuretted hydrogen.

A. THE METALLURGY OF GOLD AND ENGINEERS.—Although the metallurgy of gold has made great progress during the past dozen years, it has not yet solved numerous problems that are presented to it. This regrettable fact is the reason why when gold extraction is being carried on, nothing is thought of but gold, and why when the extraction is easy, as much as 50% or 60% of the precious metal is left in the tailings. The Transvaal some years ago, and Australia at the present time, were, or are, covered by enormous heaps of tailings containing enough gold to be very profitably worked. In the Transvaal a large number of companies have done well by treating these tailings which had been abandoned. In Australia there are districts where ore is abundant, the tailings from which contain more than an ounce of gold. In the early days the aim of gold seekers was to extract the gold as rapidly as possible without paying attention to the yield obtained. This action can easily be explained, for gold seekers are empiricists whose knowledge of metallurgy is more than rudimentary. It is, however, more difficult to explain why many companies with large capitals are improvident. They build works which after a few years are useless. This is the case at the present time with mines in Western Australia whose situation is a critical one. Near the surface the mines have ores easy to treat, but, as the deeper levels were reached, complex sulphides and tellurides appeared, and the processes that were suitable at first are now useless.

What do the mining engineers who have charge of these mines and of the treatment of these ores, think? They wished to produce too quickly, thinking with culpable carelessness, that exploratory works were useless, and erecting plants capable of treating free milling ore, but which soon had to be abandoned in view of the difficulties of treating the ores from greater depths. Chlorination and cyaniding failed; the production fell off, the yields ceased to be remunerative, and the researches undertaken to find a suitable process cost considerable sums. Such is the state of affairs that has obtained of recent years in Western Australia, and what has happened in Australia has happened in other gold producing countries, and will be the rule in the future unless the matter is taken up, as it has been done by Mr. Grollet, by engineers with a thorough knowledge of the metallurgy of gold. The matter is one of difficulty, for an expert in the metallurgy of gold must be not only a metallurgist, but also a competent geologist, mineralogist, and chemist.

It is not enough for an engineer to be familiar with the metallurgy of gold, he must have a thorough knowledge of the metallurgy of the other metals, for gold is associated with a great number of these. This is an essential point from an economic point of view, for it is only the engineer that possesses such knowledge who can advantageously separate the other metals from the gold contained in the ores.

The elements constituting an ore are of two kinds, the metalliferous particles and the gangue. The importance of the former to the metallurgist has already been discussed. The other element, the gangue, plays an important part, and it also has been most often neglected, and, nevertheless, it is on it, in many cases, that the mode of treatment of the ores depends. By having disregarded this other element (quartz, magnesia, baryta, lime, etc.), and by having only considered the metals contained in the ores that the gold metallurgists have committed grave errors.

B. CONCENTRATION.—The separation of the different metallic species contained in a comminuted ore with the associated gangue and sterile rock, is based with rare exceptions on the differences in the specific gravity of the elements which are to be isolated. The separation is effected more easily and also more

fragments are classed according to their volume. In this way the products that should be obtained result from a classification which is based on the size of the equivalent fragments. It is applied to fragments of ore less than 0.0015 metre, or, in other words, to sands and slimes. Two methods are generally used to effect the separation of this material. In the first method, the matter to be treated is subjected to a horizontal current of water of decreasing velocity; the heaviest particles are deposited first, and the lightest last. The classes thus obtained are subjected to a vertical ascending current of clean water. The apparatus of this class are used for classifying sands of 0.0015 to 0.00025 metre diameter and for the simultaneous separation of all the finer particles of slimes. These appliances are known as sand Spitzkasten. In the second method the sorting is effected in the horizontal current only, without the aid of the ascending current. The slime Spitzkasten are of this type.

In order to separate the material classified by equivalence, the simplest method would be by screening. Two methods are, however, generally employed. In the first method, the mixed minerals classified by equivalence are placed on a screen covered by a bed of pebbles and subjected to an oscillating current of water with a short stroke (piston jigs), and by a suitable contrivance the fine particles filter down between the bed of pebbles and the screen, the larger grains remaining on top. In the second method the mixed minerals classed by equivalence are subjected on a surface slightly inclined, a table, to the action of a thin layer of water. It is there exposed to the action of the water, which runs with variable velocities at the different levels of the liquid layer. The result is that the different particles receive a different impetus according to their diameter, the finest roll slowest, the largest roll most rapidly, and are finally thrown off. The separation of equivalent sands is effected by two methods: piston jigs and tables (percussion tables, round budles, etc.). The separation of equivalent slimes is effected only by tables (circular rotating slime tables, Linkenbach's fixed slime table, Rittinger's percussion table, etc.).

(b) DRY SEPARATION.—Let us imagine matter falling in a vertical shower on a fluid itself animated by a horizontal velocity. The practical realization of this system would present great difficulties if water had to be employed for the purpose. The obstacle disappears if in its place a current of air is used. This gives rise to wind classifiers or dry separators. Their principle is analogous to that of the vanning of cereals. The vanner imparts to them periodically a movement that throws them vertically. The wind then acts in very unequal ways on the chaff and on the wheat, owing to the disproportions of the surfaces presented by the two substances for equal mass. The former is carried away by the air current, and the latter falls in place. This principle is applied with the aid of a continuous movement, and not an alternating one as in vanning, to slimes so fine that the contact of water converts them into a paste that cannot be dealt with by the different methods of washing. It is also employed with excessively thin layers, such as are given by the gold tellurides of Colorado which float and are carried away by the water. This method is also used in hot countries where water is wanting, the dusts there being naturally dry and very mobile. For this reason it is adopted at the Sonora gold mines in Mexico and in the gold mines of Western Australia. In other cases it is frequently necessary to subject the matter to be treated to a preliminary drying by the application of waste heat, such as furnace gas or spent steam.

Mr. Grollet made some experiments with an auriferous mispickel, the results of which are given in Table I.

TABLE I.

	Original Sample.	Sieve Very Fine.	1—Fine.		2—Medium.		3—Large.		Dust Chamber Light.
			Rich.	Poor.	Rich.	Poor.	Rich.	Poor.	
Silica, per cent	78.60	79.00	73.40	78.40	67.50	91.20	53.40	86.30	83.20
Iron and alumina, per cent.....	9.66	9.87	10.57	9.45	14.28	3.40	29.40	5.04	7.63
Arsenic, per cent	2.94	3.31	4.08	3.49	8.82	Trace	6.25	1.47	2.45
Calcium sulphate, per cent.....	6.55	6.31	7.76	6.31	5.58	4.25	8.01	5.82	5.09
Sulphur, per cent	9	3	10	5	32	2	28	4	2
Gold in grammes per ton	520	80	200	120	90	30			
The sulphur was not determined.									

completely when the difference of the specific gravity of the elements to be separated is greater. The separation may be effected by two means:

(a) Wet separation.

(b) Dry separation.

(a) WET SEPARATION.—In order to separate one from another and from the worthless matter, the elements of a comminuted ore, by the application of the principle of the difference of specific gravity, the following method is generally used: The comminuted ores are first classified approximately according to their specific gravity, and after that the equivalent

In these experiments a wire sieve and a hair sieve were used. The ore was first stamped dry through a No. 40 screen.

In its passage over the wire sieve the ore was divided into two classes, the very fine particles and another category, more considerable, which passed to the hair sieve. A classification by volume was thus effected. The hair sieve had three receptacles, in each of which rich and poor ores were collected. On leaving the sifter, the very light particles of ore passed into a dust chamber.

(TO BE CONTINUED.)

A New Line of Diamond Drills.

The Standard Diamond Drill Co. of Chicago, Ill., has brought out a new line of diamond drills. The officers and engineers of this company were for many years officers and engineers of the old M. C. Bullock Mfg. Co., founded by the late M. C. Bullock, whose chief specialty was the Bullock diamond drill. Soon after the death of Mr. Bullock, the officers of the old Bullock Co. incorporated the Standard Diamond Drill Co. and have designed and put on the market a new line of diamond drills. These drills are for the most part based on the old Bullock drills, but the knowledge of the Bullock drills and the experience in their use on the part of those connected with the old Bullock Co. have enabled them to design a new line of drills containing many points of excellence, the best features of the old Bullock drills being retained and new designs introduced.

The general arrangement of the drills may be seen in Figs. 1 and 2. The hoisting drum and engine are placed on a baseplate with the swivel head in front. This arrangement makes all the working parts of the drill accessible and enables one to remove the engine and supply its place with an electric motor by using a baseplate of slightly different design.

These drills are claimed by the manufacturers to be equally well adapted for being operated by either steam, compressed air or electricity. The engines are especially designed for diamond drill work, and the electric motors furnished are wound up especially for this purpose. It is to be noted that each of these drills may be fitted with either positive screw feed or the hydraulic feed. Fig. 1 illustrates the "D M" drill with the positive screw feed and Fig. 2 the "E M" drill with the hydraulic feed.

The screw feed gives a uniform rate of advance to the bit, ranging from $\frac{1}{16}$ -inch to $\frac{1}{8}$ -inch to each revolution. The change in rate of feed can be made instantly while the drill is running; this adapts it to rock of varying degrees of hardness. The swivel head for this type of feed is fitted with a thrust indicator, which shows the exact amount of pressure on the bit at all times, designed thus to indicate the instant the bit passes from one stratum of rock to another—an important point in drilling through minerals where it is not possible to get all of the core, as in very soft ore or coal. It is thus designed to locate fissures, crevices, etc. The hydraulic feed is of the double-cylinder type, the two cylinders being piped together and the feed controlled by one valve. With the hydraulic feed the pressure of the bit re-

heads. Before beginning the drilling, the drill is firmly bolted to the foundation timbers and is not moved until the hole is completed, insuring perfect alignment of the drill with the hole and preventing

drills—that is, those having a capacity of 4000 feet and upwards—are especially designed for rapid handling of the long line of heavy rods. A line of drill rods a mile long weighs about twenty tons. To remove and replace this line of rods in the shortest possible time is the problem designed to be solved by these deep-hole drills. Fig. 3 illustrates the feed gear of the "G M" drill, which has a capacity of 5000 feet. These feed gears are operated by a pair of tandem compound engines; each drill is equipped with a hoisting apparatus for handling the rods. These deep-hole drills were brought out to meet the demand for the deep prospecting required in South Africa and to reduce the time required in sinking deep holes.

The drill rods are all made especially for this work and to combine strength and lightness. The bit blanks are bored out of solid stock and care is used in tempering all blacksmith work. A feature of the Standard diamond drills is their inter-changeability of parts. Each drill is designed to be operated with either an engine or an electric motor; each drill may be fitted with a swivel head of either the screw-feed type or the hydraulic-feed type; each drill may be equipped with boring tools of any size, ranging from the Class "B," which cuts a $\frac{1}{8}$ -inch core, to the Class "E," which cuts a 2-inch core. Boring tools can be furnished up to 2 feet in diameter for special work.

Chemical-Metallurgical Notes.

PREPARATION OF CHLORINE BY MEANS OF CHLORATE OF SODIUM.—C. Graebe (Berichte XXXIV., page 645). Hydrochloric acid, sp. gr. 1.1, is heated to incipient boiling, and, by the aid of a stoppered funnel with a long, thin stem, a fine stream of commercial chlorate of sodium, 500 grams to the litre, is run in. The gas is thus given off at about 100° C., and only contains very small quantities of peroxide of chlorine, which in this proportion is without objection for the ordinary uses of chlorine. It can, however, be removed, if desired, by means of a wash bottle, ClO_2 being more soluble in water than chlorine is.

ELECTROLYTIC ESTIMATION OF COPPER IN IRON.—H. Koch (Ziet. anal. chem., 1902, 41, 105, 107). One hundred grams iron are dissolved in 400 c.c. of 30° B. sulphuric acid and the insoluble residue collected on a filter. If the iron is high in carbon, wash residue back into beaker and boil with fresh sulphuric acid to insure solution of the last traces of iron; then filter on same filter, wash, dry and ignite. Dissolve in hydrochloric acid, evaporate the solution to dry-



Fig. 3.—"G. M." Drill; for Deep Holes.

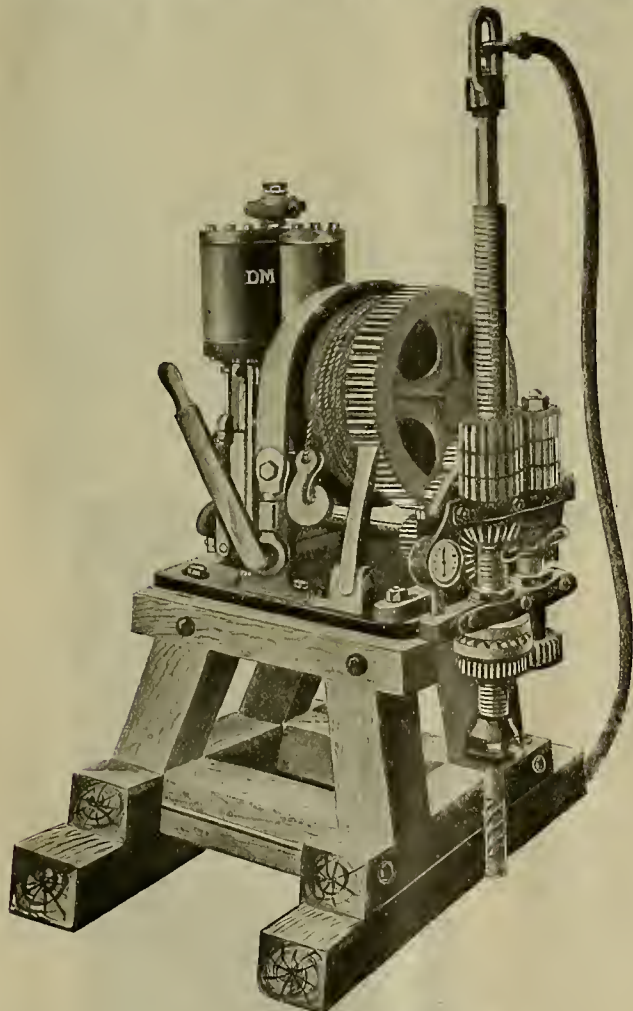


Fig. 1.—"D. M." Drill; Screw Feed.

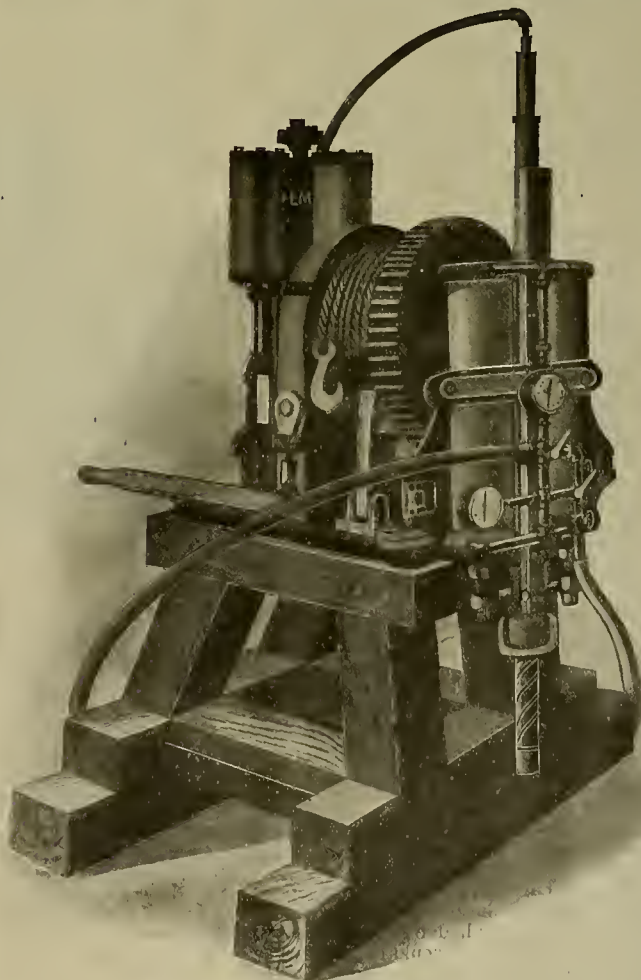


Fig. 2.—"E. M." Drill; Hydraulic Feed.

mains constant. This pressure is indicated by two pressure gauges, which enables the operator to adjust the pressure of the bit to the hardness of the rock, and to prevent undue wear on the diamonds.

These drills are all provided with hinge swivel

breaking the drill rods at the couplings and saving the time required to move the drill back in order to handle the drill rods in and out of the hole.

The drills manufactured by this company range in capacity from 350 feet to 6000 feet. The deep-hole

ness with sulphuric acid, redissolve in 20 c.c. of water and 20 c.c. nitric acid, sp. gr. 1.2; dilute to 120 c.c., add a few drops of oxalic acid and electrolyze for nine to ten hours with a current density of 0.094 ampere per square centimeter.

Hoisting Works for Deep Mines.

NUMBER IV.—CONCLUDED.

The president said there was undoubtedly a great deal of matter in Mr. Behr's paper which required very careful consideration and merited very full discussion. Mr. Irvine and others who had addressed the meeting had shown, as he almost expected, that in this case, as in most others, there were "two sides to every question." One of the chief points of difference which the discussion seems to have elicited was whether it was preferable to use heavy conical drums—such as would be necessary if taper ropes were employed—or lighter ones, as operating upon the Koepe or Whiting system the weights to be moved were far smaller, and the author scarcely seemed to have devoted quite as much attention to the merits of these two systems as they perhaps deserved. There was, undoubtedly, it seemed to him, a great objection to the use of heavy conical drums of large diameter, not only on the score of cost of construction, but in the matter of transport, which involved the inconvenience of sectionalizing them.

In the Whiting and Koepe systems, the drums being small, the engines get up to speed in three or four revolutions, and steam could be carried to the end of the run; and the remarks of Mr. Graves and Mr. Hughes bore upon this aspect of the problem. The difficulty caused by the rope slipping might, he believed, be minimized to a great extent by employing a special form of groove, the rope running on the driving pulley in a horn beam or on a rope packing. The slipping of the rope was a point which the author laid a great deal of stress upon, but Mr. Irvine had pointed out that what slipping took place was always a hack slip, and did not really seriously affect the question, as it was seldom excessive enough to cause much trouble. The system to which Mr. Irvine had referred in which the engine was set, as it were, at right angles to its usual position was, he believed, known as Marshall & Hopwood's, which had been described in the Engineer, and by its use drums of almost any length might be employed without fear of the rope overlapping on the drum or angling on the sheaves. The same result was obtained by the traversing engines at Dolcoath.

Another question of great importance that had been raised was whether winding should be done in one or two stages, and he could not help thinking that there was a great deal to be said for sinking as deep as possible in one lift, and, if requisite, providing an auxiliary winder worked, as might be done, perhaps preferably by means of electricity. The character of the material of which the rope was made must also largely influence the system adopted, as Mr. Jennings and as Mr. Hughes had pointed out, and the problem was to a certain extent in the hands of steel manufacturers, but beyond a certain length round ropes would not support their own weight. Mr. Whitmore had made the remark that the requirement of safety in the United States was not as high as that which appeared to be required in the Rand, one being 7 and the other 5, and this was another matter that must be taken into account, as it would be apt to modify the condition which had to be provided for; but doubtless a high factor of safety was desirable, especially when winding from great depths.

The two-stage system certainly appeared to be likely to prove a more expensive method than operating in one lift, and it presented various difficulties in shifting ore and men from one stage to the other, and to a certain extent must affect the life of the ropes and the ventilation of the mine, to which Mr. Rathbone had drawn attention. They were much indebted, he was sure, to Dr. Simon for giving them a description of the winding system he had described, and, as Dr. Foster had said, the system of "pneumatic hoisting" was not altogether in the air, as it had been used at the Epinae collieries by Mons. Z. Blanchett. He believed B. H. Brough gave some details of this novel system in a lecture on "Mining at Great Depths," which he delivered before the Society of Arts in 1896. The Hottinguer shaft, where this method was applied, was 1980 feet deep and 5 feet 3 inches in diameter. But he understood that the system described by Dr. Simon, about to be tried in Switzerland, involved the use of compressed air, instead of exhausting the air, which was the plan followed at Epinae. In considering a problem of this kind one was faced with the difficulty that, as in all pioneer engineering work, a number of side issues were involved, and the only satisfactory demonstration of theory was by practical trial; consequently, a number of the points at issue could be only argued in advance on purely theoretical grounds.

The application of careful preliminary investigation, such as Mr. Behr and those who had taken part in the discussion of the paper had bestowed upon it, might, however, and, he hoped, would be, the means of saving much waste of money that would be liable to result if the problem of deep winding was tackled, so to speak, blindfold on the happy-go-lucky principle, which had cost untold sums of money in times past. But, with more scientific methods and higher technical training, he thought such methods in mining engineering were becoming more rare, and were likely to become still more so.



Shaft House and Buildings, Ajax Mine, Victor, Colo.—(See Page 30)

Hydraulic Mining Costs.*

By W. E. THORNE, Georgetown, Cal.

CONDITIONS AND RESULTS OF OPERATION OF GOLD BUG MINING CO., AT GEORGETOWN, EL DORADO COUNTY, CAL.—This district drains into the American and Sacramento rivers, and is thus subject to the U. S. Debris Commission, which requires building a dam to impound the tailings. The property of the company lies in a canyon, 1½ miles long, average width 200 feet; maximum depth, upper end, 23 feet; minimum depth, lower end, 7 feet. The difference of depth is due to the existence, at the upper end, of "seam-diggings," which have been depositing their tailings in the canyon for fifty years. These tailings have been carried down and scattered over our ground by every freshet, until, at the present time, they constitute about 60% of our gravel.

The ground is worked through hedrock sluices, mostly 8 feet wide on the bottom, and laid in a cut having at the lower end the maximum depth of 25, and at the upper end the minimum depth of 4.5 feet. At the lower end each 12-foot box has a fall of 4 inches; at the upper end, the fall is but 1 inch per 12-foot box. There is 1300 feet of the 8-foot sluice and 200 feet of 4-foot sluice, making a total of 1500 feet of hedrock sluice.

The mudsills at the head of each box, 6 by 6 inches in size, are held in place by a drift pin of ¾-inch round iron, driven into hedrock horizontally, at each end. The intermediate mudsills are 4 by 6-inch pieces, placed on edge, and held in the same way as the end sills. The bottom is of 2 by 12-inch stuff, with a centerboard 1.5 by 18 inches, placed on edge, so that at low water one will carry the water while the other is being cleaned up. The sides, 36 inches high, are made up of two 1.5 by 18-inch boards on each side, and have a hatter of 1 inch in 6 inches, making the sluice 1 foot wider at top than at bottom. The sluices are paved with 6-inch blocks, set on end. The construction cost from \$4 to \$150 per linear foot. Hand drilling in hard diorite, which constituted a part of the formation at the lower end, was the cause of the maximum cost. Most of the cut is through Mariposa and Calaveras slates.

Our grade became so light (1 inch to 12 feet) at the upper end that we had to depend on the maximum flow of the creek (about 3000 miners' inches, which continues for only about fifteen days in the year) for our sluice-head. Our head for the giant was obtained, at a cost of 0.5 cents per hour per miners' inch, from a ditch owned by another company. We used, through a 3-inch nozzle, 200 miners' inches, under a head of 180 feet. Our average of material moved was 43.5 cubic yards per hour—a very low duty, due to our working up-stream.

Our supplies, delivered at the mine, cost as follows: Lumber (rough), \$14 to \$16 per M.; powder, 12 to 13 cents per pound in ton lots; fuse (triple tape), by the case, 50 to 55 cents per 100; caps (No. xxx), 60 to 65 cents per 100; round iron (½ inch diameter), 35 cents per pound; nails (cut and wire, by the keg) 35 to 45 cents per pound. The wages of miners were \$2.50 per day of ten hours.

WORKING COSTS PER CUBIC YARD OF MATERIAL HYDRAULICALLY MOVED.

Water.....	\$0 030
Labor.....	0 015
Debris dams.....	0 030
Moving of pipe, etc.....	0 005
"Crevicing" and cleaning bedrock.....	0 006
Taxes, salaries, etc.....	0 007

* Trans. Am. Inst. Min. Eng. (condensed).

Blacksmithing.....	0 003
Lumber.....	0 030
Labor on sluices.....	0 040
Powder, fuse, etc.....	0 017

Total.....\$0.183

* This item represents the total cost of such work, divided by the total capacity in tons of the reservoirs thus created.

† This item is exceptionally large, because of the short season of fifteen days, upon which the calculation is based, and the consequently small amount (7500 cubic yards) of material moved. The other items are more nearly a fair average; though, of course, the short season of operation had, in many ways, an indirectly unfavorable effect on costs.

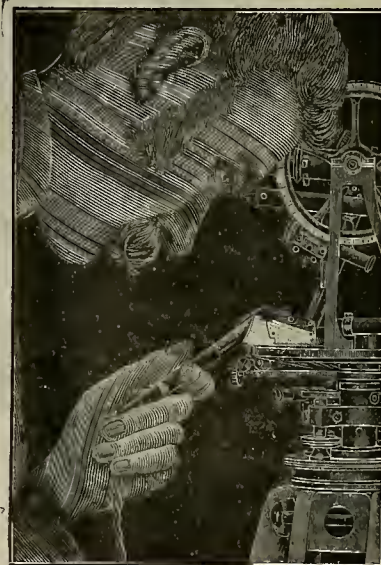
The method above described was in operation when I took charge of the mine; and, to my request for permission to substitute a dredger or hydraulic elevator, it was replied that as the existing system had been installed under the advice of experienced placer miners, I must give it a trial. The result, as the statement of costs might lead an expert to expect, was not economically satisfactory; and we are now installing a hydraulic elevator, of which I hope to have something to say in the near future.

Two undercurrents were tried. No. 1 was placed about 700 feet below the lower end of the hedrock sluice. (It should have been at the sluice and connected with it.) It cost about \$1500, and saved about enough gold to pay the taxes and interest on that investment, together with the cost of cleaning it up. No. 2, placed 1500 feet below the lower end of the hedrock sluice, cost \$1700, and has never caught enough gold to pay the cost of cleaning.

Most men write of their successes only. Why not, once in a while, tell of a failure, as I have here done?

Aladdin Reading Lens.

The K. & E. Aladdin reading lens is designed for



Aladdin Reading Lens.

engineers, surveyors who work in dark or badly lighted places, like mines, tunnels, forests, or at

night, and others. It combines a powerful miniature electric lamp with a reflector and a reading glass, constructed so that the fine readings of verniers of surveying instruments, graduations of tapes, etc., can be conveniently and accurately taken in the dark. On removing the lens, the lamp is also an excellent illuminator for the cross-hairs of telescopes. Its light is at the same time free from the danger of igniting gases, which makes it valuable in coal mines etc.

As noted in the illustration, the K. & F. Aladdin reading lens consists of a miniature incandescent lamp mounted on a light handle, $4\frac{1}{2}$ inches over all. An adjustable polished metal reflector partly surrounds the lamp and carries a detachable fine magnifying lens. On the handle is a spring switch, which permits of establishing electrical contacts for short periods, by the pressure of a finger, or for longer periods, by the action of a sliding ring.

It is connected with the battery by conducting cords 4 feet long. The battery (dry) is contained in a solid sewed leather case, $7 \times 3\frac{1}{2} \times 2$ inches. It consists of four dry cells which, for renewal, are also furnished separately in a pasteboard box, ready to slip into the leather case. The leather case is of convenient size and weight for the side pocket, or it can be carried by a shoulder strap, with which it is provided. The complete outfit weighs two pounds, which includes less than two ounces for the lamp and conducting cords. To further save waste of battery energy, there is a switch on the outside of the leather case for cutting off the current when the lamp is not in use. The battery will give light for thousands of readings before requiring renewal. The lamp and reflector are arranged to amply illuminate the field of the lens. The lens is a high-grade reading glass, especially made for reading verniers, etc. It is supplied by the Keuffel & Esser Co., 127 Fulton St., New York City; 111 Madison St., Chicago; 708 Locust St., St. Louis, and 303 Montgomery St., San Francisco, Cal.

Taylor & Brunton Sampler, Goldfield, Colo.

Written for the MINING AND SCIENTIFIC PRESS.

About a year ago the business of the Taylor & Brunton Sampling Co. outgrew their plant at Victor and it became necessary to install another sampling mill

ple is again taken, and this sample, which now represents 0.16% of the original lot, is delivered into a steel box, which is carried by an overhead crawl into the sampling room, where it is cut down on a sheet steel floor by a quartering shovel to a convenient size for the dryer.

The sample going to the dryer weighs about forty pounds and would pass through a 12 or 14-mesh. After drying, the samples are ground in Englebach grinders to 120-mesh and divided into original, duplicate and umpire samples by passing the pulp through a peculiar-shaped rifle box, in which all the cutting edges are horizontal, and yet the rifles are identical in size, shape and slope and are self-discharging. The reject from all the different sampling machines passes directly to the loading bins, from which the ore is loaded into the cars by means of hinged steel chutes. The mill is entirely automatic throughout, the ore being handled by machinery at every stage of the process. The main building is five stories high, which, including the basement, makes six floors, carrying machinery requiring supervision, and, to enable the attendants to do this with celerity and comfort, a specially designed man-elevator is run continuously from the bottom of the mill to the top. Since the completion of the mill, April 26, it has been running night and day to its utmost, and arrangements have been made whereby the fixed supply of ore has been secured for a term of years.

Liquid Fuel--Boiler Firing With Oil.*

NUMBER III.—CONCLUDED.

By JAMES W. WARREN.

The statement has been made that it takes about 4% of the steam generated to operate the oil apparatus. We have made no experiments to demonstrate the accuracy of this figure, but our observations go to show that this percentage is large.

In a small plant like this, which is subject at times to a total shutdown in case the steam of all boilers goes down, it is impossible to start the fire, in which case an auxiliary steam generator must be employed, or the firebrick removed from the grates and coal be used to get up steam.

In installing this apparatus it is necessary to com-

kilowatt-hour as compared with the use of coal, it is impossible for us to tell, as prior to the present ownership of this plant, which changed hands last fall, no records had ever been kept of the kilowatt output or the tons of coal used per month, so that comparisons are impossible to obtain. There is no question, however, but that there is a very large saving in the use of fuel oil. It is claimed by the advocates of fuel oil that four barrels of oil, forty-two gallons to a barrel, are equal to one ton of good bituminous coal.

The results of tests show that the cost of burning fuel oil is exactly half the cost of burning coal, where the coal cost \$5 per ton and the fuel oil seventy cents per barrel.

A New Form of Cupel.

Written for the MINING AND SCIENTIFIC PRESS by JOSEPH VOYLE.

For the cupelling and estimation of minute heads of gold and silver, having lost a number of minute heads on ordinary cupels, I made various experiments to obtain some other method that would be safer. At first, success was promising by finishing the cupellation with a blowpipe on a new cupel; but sometimes the litharge was so completely absorbed that the force of the flame detached the head and blew it away. Finally, I found that a kaolin slab absorbed, or combined with, a limited portion of the litharge, and held the bead securely attached to its surface; also, that the beads could be brought to a uniform shape for each size, giving a standard form for estimation of volume, or weight, by micrometric measurement.

PROCESS.—Take kaolin and wash it well in water; pour off the slime only; let it settle in a flat-bottomed dish; put enough slime in to make a dry layer two millimeters thick. When nearly dry, mark it in squares about two centimeters across. When quite dry, divide and burn; the squares are then ready for use as cupels, or for qualitative slag color tests.

Cupel the assay button, as usual, until it is reduced to one millimeter in diameter; then move it to the kaolin cupel and bring it before the blowpipe flame; the litharge will form a transparent glaze on the cupel. The button may be allowed to move around or stay in one place; if it stays in one place, the litharge will dissolve the kaolin there and make a pit in the cupel.

The small bead should not be finished in the pit, but be blown out on the flat surface and heated very hot, so as to assume a nearly globular shape, and then heated slowly so as to retain that shape. The addition of borax will discharge the lead color and leave the gold head firmly held in a nearly colorless transparent glaze.

If it is desired to remove the head, it can be taken up by a small hot spatula while the glaze is in fusion, or the cupel can be broken across at the bead.

For measurement by a micrometer in a compound microscope, this cupel presents the advantage of a distinct view, a definite form and a strong adhesion to its support.

To estimate the weight, the micrometer must be calibrated to the standard form and size of heads of known weights, cupelled on the kaolin cupel.

To make a standard, refine some gold and heat it out to a very thin sheet; cut off a narrow strip and weigh it, to get an idea of size to cut required strips. Cut a strip more than a milligram; then trim it down until it weighs exactly one milligram; do the same for nine-tenths, and so on down to one-tenth, being careful to be exact. Then take the same size strip of pure lead foil and wrap around the gold. Now take the one milligram strip and fuse the gold and lead together on charcoal; then take a kaolin cupel and put the button on it, near one edge, and bring it before the blowpipe flame; when the head is cupelled to bright gold, heat very hot; let the point of the flame be a little on one side of the head, and the head will spin around on its center, taking a nearly globular form; gradually slacken until the head sets. Examine the head for perfect surface and shape; if defective, spin again. Do the same with the others on the same cupel, putting them in a row, according to weight. Now clear the glaze with borax, and the permanent standard of gold head values is ready for use. To use the standard, make an exact drawing chart of the micrometer; place the standard on the stage of the microscope; find the exact position on the micrometer of the one milligram head, then mark on the chart, and so with all the other heads; then make a reference table of weights under the chart; then, from the position of the tenths measured, calculate other tenths as far as required, and mark the places on the chart and table. When completed, there is a quick, simple and reliable method of estimating heads too small for accurately weighing on ordinary balances and not requiring any unusual delicacy of manipulation.

In shape the head is a globe, flattened where it rests on the cupel; the cupel being flat, the form for each weight is practically uniform.

A small achromatic microscope, giving thirty to sixty diameters, with an eyepiece micrometer, costing \$8, will answer for this work.



Taylor & Brunton Sampler, Goldfield, Colo.

somewhere in the Cripple Creek district. Goldfield was the point selected, on account of its central situation, excellent railroad connections and the suitability of the hill slopes for laying out an automatic switch yard, in which the cars could be handled entirely by gravity, thereby dispensing with the use of a locomotive for switching.

The cars are received on three storage tracks, from which they run freely into the unloading building, situated on the extreme right of the cut. The cars are discharged into a steel hopper, from which the ores are drawn by means of an automatic feeder into a 13×24 crusher, after which they pass through a pair of 14×32 rolls and are then elevated to the top of the mill.

From the elevator discharge spout a 20% sample is taken by a time sampling machine and fed into a pair of 14×36 rolls. From the hopper underneath these rolls another 20% time sample is taken, and this sample, representing 4% of the original lot, passes through the pair of 12×27 rolls. From the hopper below these rolls a 20% time sample is again taken, and the sample, which now represents 0.8% of the original lot, passes through a pair of 8×20 rolls.

From the hopper below these rolls a 20% time sam-

ply with certain rules and regulations of the insurance companies in order to prevent an increase in insurance rates. These rules, however, are not in any way unreasonable, but are necessary to afford ample protection to the plant. Their principal requirements are:

First—That the storage tanks shall be buried 4 feet under the ground and 10 feet from the building; or, if located more than 100 feet from the building, may be put above the ground or only partially buried, in which case they must be surrounded by a brick or earth embankment forming a reservoir of sufficient capacity to hold double the contents of the tank.

Second—They must have a gas-tight manhead at the top.

Third—They must not be filled in excess of 98% of their capacity.

Fourth—They must have a 2-inch vent pipe.

Fifth—The highest point in storage supply must be at least 2 feet below the level of the furnace where oil is to be burned, thereby preventing gravity feed to the boilers.

What the saving has been per horse-power or

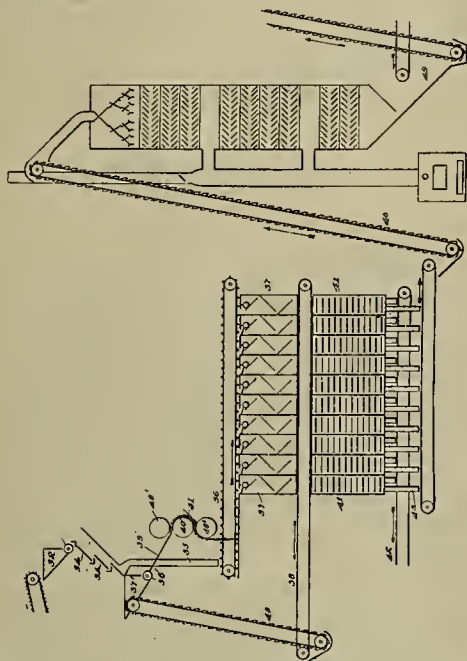
* Read before the National Electric Light Association at its twenty-fifth convention held at Cincinnati, O., May 20, 21, 22, 1902.

Mining and Metallurgical Patents.

Patents Issued July 8, 1902.

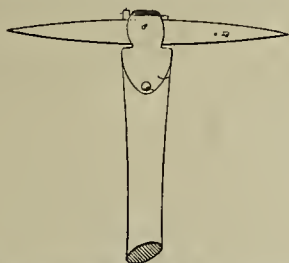
Specially Prepared for the MINING AND SCIENTIFIC PRESS.

APPARATUS FOR CONCENTRATING MAGNETIC IRON ORES.—No. 704,010; T. A. Edison, Llewellyn Park, N. J.



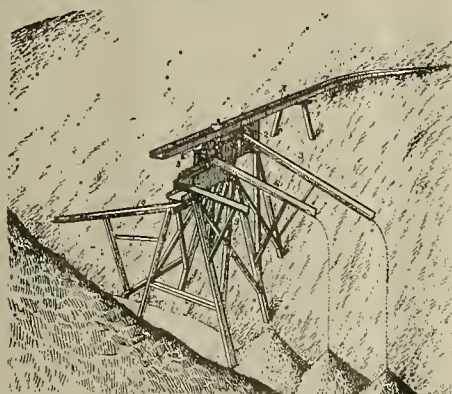
A connected apparatus for concentrating iron ore, comprising set of pulverizing rolls by which material will be finely pulverized, screen to which finely pulverized material is fed, means for returning tailings of screen to pulverizing rolls, magnetic separator for separating magnetic from non-magnetic particles of screenings of screen, drier for drying magnetic particles, fine screen to which dried magnetic particles are fed, second set of pulverizing rolls for repulverizing tailings of fine screen, second magnetic separator to which screenings of fine screen are fed and by which magnetic particles will be separated from non-metallic particles, dusting apparatus for dusting magnetic particles, third magnetic separator for effecting final separation of dusted concentrates, means for returning particles rejected by third separator to pulverizing rolls.

COAL PICK.—No. 704,039; F. Horn, Coshocton, Ohio.



Coal pick comprising helve socket provided with eye having lower wall reduced in width to present shoulder, pick having recess to engage shoulder, solid key firmly bearing against pick and walls of eye constituting non-yielding surface which will operate to prevent vibration of pick, in eye, under impact, one end of key being provided with stop, other end with laterally projecting members disposed exteriorly, operating positively to hold key against accidental separation therefrom.

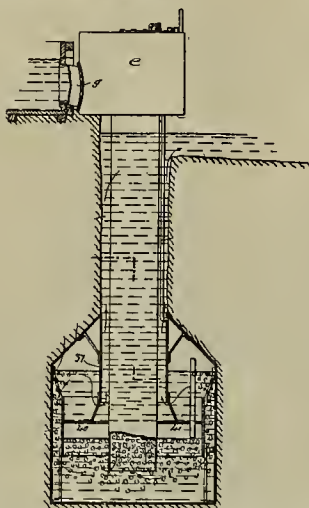
METHOD OF BUILDING DAMS.—No. 704,181; A. D. Foote, Grass Valley, Cal.



Method of building dams and like structures, consisting in first separating associated material into its coarser and successively finer elements, then deliver-

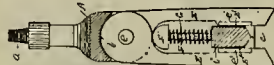
ing these separated materials by chutes or the like to form successive embankments, commencing with the coarser and terminating with the finer material.

HYDRAULIC AIR COMPRESSOR.—No. 704,059; W. J. Linton, Woodstock, Canada.



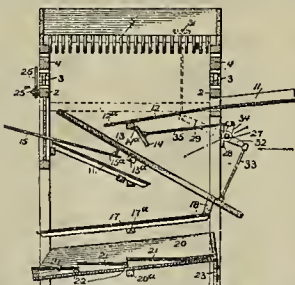
In hydraulic air compressor combination with standpipe thereof and pipe for conducting compressed air therefrom, of valvular cylindrical section of diameter to rest upon top of standpipe; vertical cylinder; means for supporting same above annular section; piston within vertical cylinder; piston rod connected at upper end to piston and at lower end to valvular section; three-way valve; branch pipe connecting lower end of vertical cylinder to one port of three-way valve; second branch pipe connecting another port to the compressed air conducting pipe; horizontal cylinder located adjacent to three-way valve; piston within last mentioned cylinder; piston rod connected at one end to last mentioned piston; bell crank lever; means for supporting bell crank lever; one arm of bell crank lever being connected to outer end of last mentioned piston rod, other arm elongated and graduated in form of beam and having counterpoise movable longitudinally thereon; lever connected rigidly at one end to valve stem of three-way valve at its other end to outer end of last mentioned piston rod; branch pipe connecting second branch pipe to horizontal cylinder, means for guiding valvular cylindrical section in its movement to and from top of standpipe.

EXPANDING REAMER FOR OIL OR ARTESIAN WELLS.—No. 704,136; J. P. Smith, Peru, Ind.



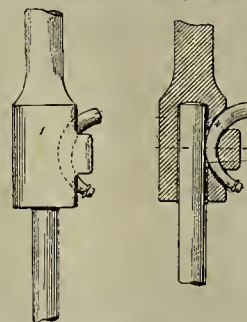
The combination in expanding reamer for boring oil or other artesian wells, of reamer body A provided with screw threaded pin a, and having slot or opening B therein with the upper end h circular, and depressions or grooves b' and D D in inside faces of slot or opening or tapering block C connecting sides A' A' of body A between depressions or grooves D D, pair of jaws E E pivoted together at upper ends by means of pin e, and having joint circular so as to fit against surface b, bearing surfaces E' E' on lower portions of jaws adapted to fit against sides of block C, and ribs e' e' thereon adapted to fit into grooves D D, and spring actuated rod F adapted to raise jaws in slot or opening B in reamer body.

GOLD SAVING MACHINE.—No. 704,372; C. Ramos, Vancouver, B. C.



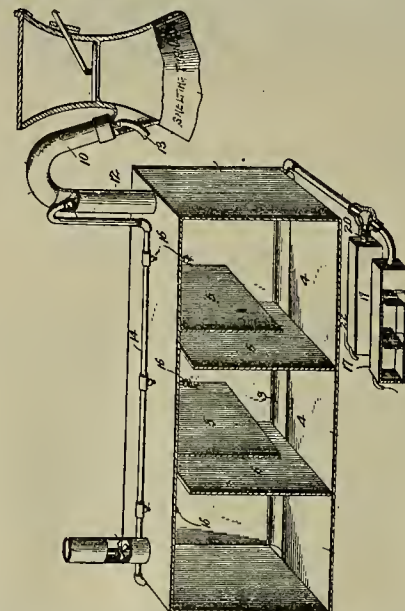
In machine for purpose specified, in combination with grizzly suitably supported on pivots and rockers over open framework; within such frame sloping dead plate 12 having perforations at lower end; grizzly 13 so pivoted below such that its slope may be varied; flap door 14 pendent on pins from lower part of dead plate 12; rake 15 slidable in sides of machine, times of which are pitched to enter spaces between grizzly bars at flattest slope; dead plate 16 adapted to throw dirt toward opposite end of machine; perforated screen plates 17 pivoted at center, linked to lower end of grizzly 13; sluice box 20 pivoted at center, provided with stepped perforated receiving plates and cross riffles, with means whereby slope may be varied as desired.

ROCK DRILL CHUCK.—No. 704,081; M. McHale, Phoenix, and J. Trainner, Ebolt, Canada.



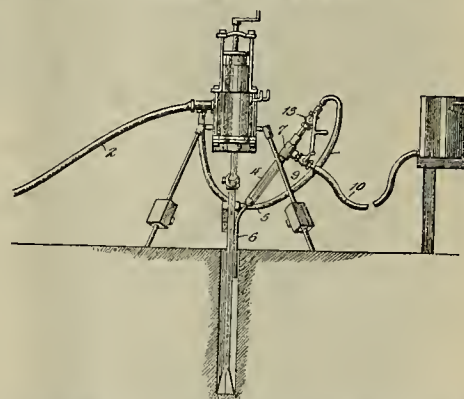
A drill chuck having curved tapering passage communicating with drill chamber, passage being circular in cross section and having ends leading out through wall of chuck at separate and distinct points, one above other, round curved tapering key fitting in passage, key provided with longitudinal groove in outer periphery.

APPARATUS FOR RECOVERING MINERALS CARRIED OFF IN THE FUMES OF SMELTING FURNACES.—No. 704,199; W. R. Lee, Marion, Ill.



Combination with smelting furnace, of precipitating chamber having baffle plates arranged therein, separating chamber into communicating compartments, induction flue connecting one end of chamber with furnace, and including means for accelerating projection of fumes to chamber and for moistening same, water spraying mechanism arranged in compartments, an eduction flue including suction mechanism connecting with other end of chamber, conduit for conveying precipitated materials from chamber, and settling troughs including valve mechanism connecting with conduit.

WATER ATTACHMENT FOR POWER DRILLS.—No. 704,158; F. L. Whitehead, Butte, Mont.



Attachment for power drills, comprising cylinder, coupling on end terminating in tube, cock on opposite end, connection from cock to fluid pressure supply pipe, second cock extending from side of cylinder and water reservoir in communication with cylinder through last-named cock.

ORE TESTING TABLET.—No. 704,409; H. E. Way, Custer, S. D.

As a new article of manufacture, composition tablet for testing ores comprising fuel, decomposable compound containing oxygen for burning fuel, oxygen compound being in greater proportion by weight than fuel.

Mining Summary.

Specially compiled and reported for the
MINING AND SCIENTIFIC PRESS.

ALASKA.

The Valdes, Copper River & Yukon Railroad Co. of Alaska has been incorporated. The road will be about 400 miles in length and will be extended to Bering strait.

At Hope City O. H. Sleeper has twenty men on the Bear Creek mine and will have his hydraulic plant in operation Aug. 1st.

The Resurrection Alaska M. Co. have twelve men getting the hydraulic plant in working order.

O. J. Thomas is sinking a shaft on the Resurrection property. He expects to sled \$50,000 worth of mining machinery to the claim next winter.

J. T. Cornforth, manager at Kenai, Northwest M. & Dev. Co., expects to start his hydraulic plant Aug. 15th.

ARIZONA.

COCHISE COUNTY.

The Calumet & Arizona Co. have bought the property lying between the Lowell and the property recently purchased by the Calumet & Pittsburg Co., known as the Del Norte mine and the Ormand group. The Calumet & Arizona Co. say they will double the capacity of the smelters now in course of erection at Douglas. It is locally stated that the smelter for the Calumet & Arizona Co., when completed at Douglas, will have a capacity of 600 tons daily.

At Bisbee a company has been incorporated, capital \$50,000, to build a street car line from the smelters near Douglas to that town, a distance of 1½ mile.

General Manager Bagge of the Black Diamond Copper Co. says that the 200-ton smelter is complete and ready to be blown in immediately upon the completion of the tramway, which will be ready for service Aug. 1. The tram is 3 miles in length; carrying capacity, 600 tons per day of twenty-four hours. He will use crude petroleum for fuel.

GILA COUNTY.

W. H. Mercer says the tunnel at the head of Mineral creek, to develop the Mercer & Valentine property, is in 220 feet. It has already gone through 28 feet of sulphide ore carrying 4½% copper.

The experts' report on the Old Dominion mine has been sent to shareholders. The Mining Record says the briquette works connected with the Old Dominion smelter will soon be ready. The profits of the company for the past year are reported to be \$2,000,000, or \$1.33 per share.

MARICOPA COUNTY.

The Winters group of gold mines has been sold to Hall & Dunkley of Chicago, Ill., for \$75,000. The property is in the San Domingo district, between Phoenix and Wickenburg, and includes the Roosevelt, Joe Wheeler, Brodie and Annie claims.

E. M. Keeley will erect the Socorro's 20-stamp mill near Wickenburg.

Wickenburg reports that a 2½-foot ore body has been struck at the bottom of the Garcia shaft which samples \$50 to the ton.

The Ryland lead mine, near Morristown, is bought by the Wickenburg Smelting Co., and will be in operation in connection with its smelter.

MOHAVE COUNTY.

Regarding the organization of the Gold Road M. Co., now going on at Paris, France, O. P. Posey and C. K. McCornick are meeting with foreign interests.

PIMA COUNTY.

E. O. Stratton is operating the Barnite group of copper mines, 25 miles from Tucson. The property adjoins the Santa Catalina Copper Co.

PINAL COUNTY.

J. W. Sharpe of Los Angeles has bought the Wonder group of mines, 25 miles southeast of Florence, on the Gila river, and has started development. The ledge assays \$4 gold per ton and 5% copper. It is close to the line of the proposed railway between Phoenix and Benson.

YAVAPAI COUNTY.

M. R. Kiley, Supt. Oro M. Co.'s Boaz, on the south slope of the Bradshaws, has his 60-stamp mill running. The old Boaz mill had twenty stamps and he has added forty, making it the largest mill in the southern part of the county.

The assessed valuation of the United Verde Copper Co. in Jerome has been raised by the assessor from \$625,000 to \$1,200,000.

Prescott reports in the Baumann Copper Co.'s property, Agua Fria district, the shaft on the Laura 200 feet. Sample assays \$6 gold, \$1.75 silver, 34% copper.

Above the 50-foot level the best value obtained was \$2.40 in gold.

CALIFORNIA.

AMADOR COUNTY.

On the Del Monte, near Jackson, since its reorganization about \$20,000 has been spent in development work. The main tunnel has been run over 200 feet, with about 100 feet farther to go to tap the first ledge, making with power drills over 4 feet per day.

The Record says the June cleanup at the Central Eureka mine was \$26,000.

At the Edinburgh mine, Clinton district, near Jackson, operated by D. Fisher, a tunnel is being driven along the foot wall of the ledge. The croppings show 1000 feet from the mouth of the tunnel. The ledge has an average width of 12 feet of quartz similar in character and appearance to some that used to be taken from the Argonaut mine when it was paying dividends.

BUTTE COUNTY.

At Oroville six transformers were recently destroyed by fire. Loss to the Bay Counties Power Co., \$3000. The Indiana dredger will be idle until new transformers are procured.

CALAVERAS COUNTY.

The Lightner M. Co. has begun suit in San Andreas against the Utica M. Co. for \$120,000 damages, claiming that the Utica Co. have been taking out ore from the Lightner ground.

W. & D. Nuner are sinking on the Duraya property, Central hill. The lode lies between slate walls 25 feet apart.

The Lloyd gravel mine on Central hill is operated by a Boston company under the direction of F. F. Ames.

The new mill on the Angels quartz mine was started by Supt. Coleman on the 10th inst.

INYO COUNTY.

In the vicinity of Ballarat there are 100 miners at work. Eastern capital is being invested there, and more looking for an opening. The Cooper mine has been sold. There are nineteen men employed at Snow canyon. The Anthony mine is turning out bullion. The Radcliff is making satisfactory showing.

KERN COUNTY.

The Randsburg Miner says the Yellow Aster's new pumps will soon be installed and the 30 stamp mill started up. The Stanford, Phoenix and Atkinson's mill will be kept busy on their own ores and in doing custom work. The construction of the Baltic's 10-stamp mill goes on. The Consolidated M. Co. is preparing for work on its claims. The Butte is pushing development work.

LASSEN COUNTY.

Amadee reports a body of rose quartz, estimated at \$700 a ton, found by Shearer, Razer & Murphy at Granite creek. The route to the mine is by the Southern Pacific to Reno, thence to Amadee on the Nevada, California & Oregon Railway, thence by stage.

LOS ANGELES COUNTY.

The Alcatraz Asphalt Paving Co.'s outside interests have been bought by the Barber Asphalt Co. of New York. Headquarters for the Northwest will be in Denver, Colo., F. P. Caughlin district manager.

NAPA COUNTY.

The Empire Consolidated Quicksilver M. Co.'s old management has retired. The new board of directors elected are J. L. Board, R. A. Boggers, H. G. Atwater, A. L. Kempert, E. H. Wilson, J. P. Thomson, J. L. Wilson. The company will be reorganized, the capitalization to be reduced from \$5,000,000 to \$2,000,000.

NEVADA COUNTY.

An early decision in the Pennsylvania-W. Y. O. D. case is expected. The Union says whichever way it is decided it means the employment of a large force of men.

At Meadow Lake Supt. Murry of the Crystal Lake Co. has rebuilt the mill blown down last winter and intends to crush rock.

In and around You Bet there are thirty men employed in the Red Dog tunnel. J. Goodwin has twenty-five men at work in his tunnel. The old Red Dog ditch will be worked.

Work has been resumed on the Murchie mine, near Nevada City, under the management of J. C. Campbell.

PLACER COUNTY.

Cass & Eckhart, at the Tadpole mine, have nearly 200 feet of the main tunnel to develop the gravel property run.

The 10-stamp mill at the Central mine, known formerly as the Dover, has started up. F. Develley is Supt.

Near Sunny South the Hidden Treasure Co. has a new blue lead channel which cuts out 200 feet of the white gravel at a point 8800 feet in.

In the Peckham Hill mine Manager Nesmith will double the present force of

twenty men. Steam will be put in temporarily to work two power drills and later an electric plant will be installed.

The owners of the Lost Emigrant mine, near Summit, have a small stamp mill and will crush ore.

At Soda Springs W. Bradbury assumes charge of Heath & Goulden's Lost Emigrant mine.

SHASTA COUNTY.

The Graham Bros. of Copper City have bonded a group of seven claims, 3 miles below Copper City, to W. F. Mitchell for \$22,500. The ore carries gold, silver and copper.

For the Great Western G. Co.'s projected smelting plant at Copley the Southern Pacific Co. began 500 feet of siding from the track to the proposed smelter site.

H. C. Wybro, Supt. McCloud River Electric Power Co. at Redding, says he will proceed with construction of the projected power plant on the McCloud river.

The Trinity River G. M. Co. has organized to develop 240 acres gravel on Trinity river, 2½ miles above Dodge's.

The Dorleska mill, Coffee creek, is again running.

Development on the Tamarack mine, at Bully Hill, will be pushed. Drennan, Sweitzer, Allen & Erickson have a \$2000 payment on a \$20,000 bond to J. T. Wall and C. W. Meyers of DeLamar, G. T. Harnson and J. Cross.

SISKIYOU COUNTY.

A. E. Diggins and Rinehart in Quartz Valley near Yreka have a 4 foot vein that goes \$1,500 to the ton. The rock is a slate and serpentine formation.

The Siskiyou Electric Power Co. will put in a plant, power to be generated by a system of flumes and pipelines, taking water from Fall creek, 14 miles above Klamath. There will be 4700 feet of flume and 2837 feet of pipe line; the plant will have a capacity of 2500 H. P.; there will be a pressure of 700 feet. The company will furnish power and lights for the mines in the neighborhood; a pole line will be run to Yreka.

The Cherry Hill M. Co. has closed down indefinitely. The manager, E. D. Baker, says the company has been so harassed and annoyed by litigation and subjected to such impositions by parties claiming properties in the vicinity of the mine, that they prefer to let the mine remain idle, and will spend money in the development of other properties owned by them.

Near Seiad, Skein, Murray & Co., owners of the asbestos mines in the Red Hills, are working the property.—The Furber mine is bonded to a San Francisco company; six men are prospecting the ledge.

O. H. Hershey & Co. of South Fork of Salmon have machinery for a new 1000-pound stamp mill.

Ruddles Bros., in Scorpion gulch, near Trinity, have put in a new 5-stamp quartz mill.

A long tunnel is projected at the Yellow Rose of Texas quartz mine, on the headwaters of the Salmon river. The property is owned by G. L. Carr.

TRINITY COUNTY.

The California Mother Lode G. M. Co. organized in Spokane, Wash., to work their property 2 miles north of the Midas mine.

The Headlight quartz mine, near Carrville, will erect two new cyanide tanks right away, to enlarge the capacity of the plant to eighty tons daily. Fourteen men are on the payroll.

TUOLUMNE COUNTY.

Near Groveland, J. M. Melghan has a three years' lease on the Mt. Jefferson property. A company is to be formed, the mill started and a cyanide plant added.

Near Columbia, work is to be resumed at the Oakland mine. It has been bonded by E. J. Gilbert.—The Keltz mill is dropping its ten stamps continuously.—A new shaft is being sunk on the Treasure group for gravel.

Supt. Muir has men working the Richards gravel mine, near Springfield.

The Golden Dawn, near Black Oak station, is to be opened by Nicholls Bros.

The Mazeppa has begun building a 20-stamp mill.

Supt. H. C. Converse has the Draper in operation; thirty men are employed; ten stamps will be added.

Munroe, Birney and Wainwright will extend the Morris tunnel, now in 700 feet.

COLORADO.

ARAPAHOE COUNTY.

(Special Correspondence).—The Colorado Zinc Co., which has been closed down since June 27th for repairs, is now running again.

Denver, July 13.

BOULDER COUNTY.

(Special Correspondence).—The McKenzie well at Boulder is down 2580 feet and is the standard well of the field. Casing will be placed in the well and a

wall packer used. They will also use the California pump. Capacity of well fifty barrels per day. They are selling the oil at \$2.50 per barrel to gasoline engine and fuel men for use in stove burners and heaters. There is no question as to the market for the oil. They can sell all of the oil produced in the field to the Florence refinery, but do not realize the full value of the oil, as the refinery pays for only the refined contents. Preparations are now being made to erect a refinery at Boulder where they will do their own refining. There are fourteen producing wells in the field. There are 150 derricks; thirty wells are now being drilled. The territory in which oil has been found is 2 miles by 6 miles. There are no gushers in the Boulder field, but all the wells are a pumping proposition so far.

Boulder, July 11.

B. A. Langridge, representing Boston capital, has bought the Black Cloud group, Gold Hill district, \$25,000 down. The group is one of fourteen mines idle since 1880. The ore bodies were not sufficiently remunerative under the old prices of treatment. At the time they were closed \$42.50 a ton was the price charged for treating \$50 ore. Less than \$7 a ton is the price at the present time.

Wall Street reports the large and rich pieces of sylvanite ore from the Sphinx mine, at a depth of 140 feet, in sinking the main shaft on the lode, are owned by G. W. Teal of Boulder.

B. A. Langridge of Ward has sold the West Point mine to the West Point M. Co. for \$15,000.

CHAFFEE COUNTY.

(Special Correspondence).—The Accidental M. & M. Co. at Granite have been doing a great amount of development work since May 1, 1901, in sinking shaft and driving a tunnel. The shaft is now down 175 feet with two drifts, one at the 50-foot level, 35 feet, and one at the 100-foot level, 60 feet. The ore in the shaft is free milling and runs from \$24 to \$60 per ton. They now have the tunnel in 375 feet. Two hundred and thirty-seven feet from the mouth of the tunnel they cut a vein which has a pay streak 40 inches wide, which is a concentrating ore running \$15 to the ton. Three hundred and forty feet in they cut another vein 2 feet wide, which runs about the same. F. G. Mitchell is the manager.

Granite, July 13.

Another strike is reported in the Vivandiere mine at Turret.

The Independence has a shaft 7x12 feet to a depth of 80 feet and every bucketful taken out has been paying ore. New ore bins have been completed.

The shaft in the Anaconda is 150 feet deep. With an additional 50 feet, it is expected to be a paying mine.

Salida tells of a strike in the American Flag, one of the principal properties owned by the Sunset Con. M. & M. Co., Manoa district, a rich sulphide, carrying values sufficiently encouraging to justify increased working force. The vein is 3 feet wide. Manager Higham says extensive facilities are contemplated.

CLEAR CREEK COUNTY.

(Special Correspondence).—The Empire Tunnel Co., F. A. Maxwell, manager, have their tunnel in 1100 feet, and still driving about 5 feet per day. They have a pipe line 2400 feet long which supplies the water for their 6 foot water wheel. The drill men have encountered some very hard ore, which is the cause for the small amount drilled each day.

The Royal G. M. & T. Co., Empire, have run into an 8-foot vein of milling ore which assays \$9 to the ton. Alongside of this is a 4-foot streak of black sulphurets and solid smelting ore, making a 12-foot vein in all. The tunnel is now in 200 feet. These parties are preparing to put on a power plant to consist of compressor, drills, etc. Bids will be asked for shortly.

The Marshall-Russell M. M. & T. Co., Empire, have a 5-foot vein in the lower tunnel which runs \$10.80 per ton.

The Atlantic mill, Empire, which has been in operation the past four months, are handling fifteen to twenty tons of ore per day. They are at present handling the ores from the Gold Fissure mine. This mill is amalgamation and concentration.

Empire, July 9.

(Special Correspondence).—The Capital Prize Tunnel, Georgetown, are sinking a shaft from the tunnel level and are down about 75 feet. They have a vein 16 inches to 20 inches running \$51 per ton in silver, \$25 in gold, 5% lead and 2½% copper. The tunnel is now in about 800 feet and 700 feet of drifting. There is a 70-foot shaft from the tunnel level through to the surface. Twelve men are employed on the property, which is under the management of G. J. Hite.

The Georgetown Deep Mining & Transportation Co., operating the Kelly tunnel, B. F. Kelly, manager, are in over 650 feet, and still driving. Last month they made

a run of 184 feet with two drills. They have installed a third drill and expect to make rapid headway in future.

Georgetown, July 10.

(Special Correspondence).—The Franklin Con. M. Co. are operating the Silver Age and Franklin mines, also the Wilkie mill, using the Silver Age mill for a power plant. They have received considerable ore from the Saratoga in Russell gulch, Gilpin county, for treatment at the Wilkie mill.

The Bertha Gold M. & M. Co., Idaho Springs, which changed hands the first of July, B. Ross assuming control, opened up a slope 100 feet, 18 to 36 inches wide, in the Colfax shaft. The mill dirt assays \$11.50 per ton and the smelting ore \$45.50 per ton. C. J. Portner is the new owner of the Bertha mill, which he is operating steadily, principally on their own ore. The offices of the Bertha Co. will be moved from Denver to Idaho Springs. C. K. Miller, foreman.

The Bonieta mill, F. F. Reed, manager, is running fifteen stamps amalgamating and fifteen stamps concentrating. They ran some ore from the Grand Central mine of Central City and saved 96%.

Idaho Springs, July 11.

Georgetown reports the Clark group, owned by O. E. Clark of Pueblo, sold to the Waldorf M. & M. Co. for \$60,000. The group, which is in the East Argentine district, contains twenty-four patented claims, connected with the other holdings recently acquired by the company.

Rich ore is being mined at the Independence, through the Tobin tunnel, carrying gray copper, silver and gold. Manager Wilcox will drive a crosscut tunnel to the Stevens group in the East Argentine district, which is also owned by the company, thus cutting the different veins at a depth varying from 1000 to 2000 feet.

J. D. Hartshorn has a 6-inch streak of galena ore in the Pacific lode, on Republic mountain. The ore assays 63% lead, which, added to the gold and silver values, makes \$60 per ton.

Tunnel mining is becoming the only way in Clear Creek district, says McClelland of the McClelland tunnel at Dumont. "It takes longer to get at the mineral, but when you get there you are fixed and you know what you are doing. In districts where deep mining is necessary, as in our camp, the driving of tunnels is superseding all other forms of mining."

Near Empire, the Black Cat group, formerly owned and operated by a Denver company, and including the Little Hope, Portland and Snowstorm claims, has, since passing into the possession of practical miners, developed into an attractive property.

By the advance of the Empire Tunnel Co. into Covode mountain to a connection with many lodes crossing its course toward North Empire, the group of lodes recently acquired by the Republic Consolidated Co. on Covode mountain, including the San Pedro and Diamond B claims, which abut upon the tunnel, can be opened 500 feet below the surface by a short lateral, their extensions having already been intersected.

At Yankee, the Yankee Con. M., M. & T. Co. has started its Lombard mill on ore assaying \$15 to the ton. The mill handles ten tons every twenty-four hours. Manager Seeman has decided to increase the daily capacity to forty tons.

Coal laid down in North Empire is \$8 a ton.

GILPIN COUNTY.

(Special Correspondence).—The Slide lode in Russell gulch, which was sold in May to J. S. Shenneman and J. F. Werner of Bronson, Mich., is now down 85 feet and has smelting ore that runs \$62 per ton. This property is an extension of the Lillian lode and the vein carries both milling and smelting ore. It also is near the Old Town mine, which is working a large force of men and shipping every day. The property is located on the Gilpin county tramway and in time will no doubt be a good producer.

Unwatering the Charter Oak mine at Central City is finished. The shaft will be sunk 200 feet deeper.

During the first week in July the ore and concentrate shipments from Black Hawk to Denver and Golden smelters amounted to 1800 tons.

GUNNISON COUNTY.

Near Gunnison the Augusta M. M. Co., C. L. Arzeno general manager, is working the Augusta property. The tunnel being driven into Augusta mountain from the Pittsburgh camp side is in several hundred feet. When completed in January, 1903, it will cut the ore at 1600 feet depth. The company is packing out at present with a jack train from the Dark canyon side of Augusta mountain about five tons daily, which goes to the smelters. The output is small because of the inconvenience in getting it to a railway shipping point. The new tunnel from the Pitts-

burg side of the mountain will do away with the jack train. An aerial tram is to be put in to connect with the mill and also an ore station on the wagon road. A new mill with a probable capacity of fifty tons is to be erected to handle the milling ore. The Dark canyon tunnel on the west side of Augusta mountain is at present producing all the ore taken out. The tunnel has been driven in over 1000 feet and cuts the ore at a depth of 320 feet. The same company is operating the Excelsior and Yankee Blade lodes in the vicinity of the Augusta mine. This enterprise is known as the Black Queen M. Co. and was recently organized to develop the properties mentioned. A plant of machinery is being installed and air drills will work the new tunnel.

The Cochetopa mill being built at Cochetopa by the Colorado Con. M. Co., will be completed Aug. 1st. Twenty-five men are employed. The mill will have a capacity of forty tons daily. The mine and mill together will employ forty men.

HINSDALE COUNTY.

A 150-ton concentrating mill will be put in by the Henson Creek Lead Mines Co., 14 miles from Lake City.

LAKE COUNTY.

Near Leadville, in the Yak tunnel, there is an unusual amount of work. A new compressor will push the bore into the heart of the Ibez territory.

Near Leadville the South Evans & Ball Mountain M. Co. closed down July 1st to arrange for a new milling and concentrating plant. Manager Murray says the new plant will have a daily capacity of seventy-five tons. The shaft will be sunk another 100 feet while the mill is being erected.

Near Leadville the Big Evans M. Co. expects by Aug. 1st to have its new machinery in position for draining from the Hoffer shaft on the Bob Ingersoll claim.

OURAY COUNTY.

Ouray reports a rich strike on the Johnny Bull, Uncomphagre district.

The ejectment suit in which the stockholders of the Home pyritic smelter were the defendants, and which was decided against them, will be the means of starting up the workings again. W. Story is in possession and says that the smelter will soon be in operation for the treatment of large quantities of low-grade ores.

The new Camp Bird M. Co. is contemplating abandoning the Ouray office and having all the business transacted at the mine.

SAN JUAN COUNTY.

Near Silverton the Kendrick-Gelder smelter has blown in, with 5000 tons of ore on hand; capacity 100 tons per day, requiring fifty men. The new briquetting machine is in operation.

At the North Star, Sultan mountain, to fight the water in the lower workings will require an increase in pumps and an extra engine. Foundations are being prepared for a 300 H. P. boiler, two 125 H. P. engines, two 100 H. P. electric generators and motors and other machinery. The present 125-ton mill is to be enlarged and outfitted with additional machinery. On one side of the mill an addition of 70 feet will be built and on the south side an additional 90 feet for ten new concentrating tables.

On Bear creek for the Good Hope, Little Giant and Sylvanite mines a mill will be erected at the Good Hope to treat the ores by the Gage process.

SUMMIT COUNTY.

At Kokomo the Breene mine will ship 100 tons per day. The Wintergreen starts up next month. Mr. Shepherd of the Ten Mile will continue as manager. All mines are paying \$3 per day of eight hours.

A strike of ruby silver in the Eureka mine at Montezuma shows a 14-inch vein, assays running 5000 ounces to the ton.

Ueva lake, in the heart of the Ten Mile mining district, is bought by Howbert, Ford & Gard of Denver. In addition to the lake they have acquired a waterfall capable of generating power sufficient to operate the mines and smelters of Leadville, Kokomo and Robinson. The new owners plan the erection of a plant at the foot of the hill, 3 miles above Frisco. The Denver buyers have 285 acres of patented land and 790 acres of located land, besides the 55 acres of water, with average depth of 100 feet.

TELLER COUNTY.

At Cripple Creek the Vindicator Con. G. M. Co. pays a \$55,000 dividend to-day. The company has opened the main Lillie Vindicator vein at a depth of 1200 feet, the vein the same width as above, the values higher. The new pump was shipped on the 15th to be installed in the 1200-foot workings.

Work has been resumed by C. Crowder on the Maid of Orleans, Beacon hill, sinking 500 feet.

A. B. Demasters has a bond and lease in \$150,000 on the Maggie mine on Bull hill. The property consists of nine acres and

lies in the vicinity of the Gold Sovereign. The lessee is required to do 50 feet of sinking every month.

The officers of the Pharmacist Co. say that all the indebtedness of the company has been paid off.

The Brodie mill on Cripple creek, at Mount City, has been leased to O. B. Finn, who will treat low-grade oxidized ores. He has the lease on the Gregory dump of the Elkton, on Raven hill, and estimates that he has 15,000 tons of ore there that will average \$10 to the ton. The mill has a capacity of sixty tons a day. This is the third cyanide mill to treat the low-grade ores; fourth is to be erected by the Mineral Point Co. on the Mineral property.

Work is to be resumed on the Santa Rita property of the Atlantis G. M. Co. T. F. Caley has a two years' lease at 15% royalties.

The payroll for the Cripple Creek district for the month of June amounted to \$700,000.

The Practical Leasing Co. has been making a production of thirty tons of ore a day from the Trachyte and expects to be able to increase to fifty tons a day.

The deepest shaft in Cripple Creek district is the Eagles, 1540 feet.

IDAHO.

The U. S. assay office shows that the production of gold, lead and silver in Idaho during the calendar year 1901 was \$16,461,916.

BANNOCK COUNTY.

The sale of the ceded lands in the 5-mile limit was held at Pocatello this week.

BLAINE COUNTY.

Supt. Ford, operating the South Boise placers, near Hailey, has a channel 132 feet deep and 300 feet wide. The company owns 120 acres. Some of it yields 20 cents a cubic yard.

The Maryland G. M. & D. Co. organized at Hailey to exploit the Maryland, Golden Star, W. J. Bryan, Chicago and Boston lodes, on the Hailey gold belt.

IDAHO COUNTY.

At White Bird, E. M. Aldrich, who owns the Dorneck bar, will put in a dredger capable of handling a cubic yard of earth a minute. The property comprises eighty-five acres of placer ground, portions of which have been worked in the old-fashioned way for forty years. This will be the pioneer dredger of the Salmon river placers.

T. S. Hogan of Butte, Mont., secretary and treasurer of the Crooked River M. & M. Co., Elk City, says the company started with twenty stamps and will now add another ten.

F. E. Johness, Supt. Gold Ridge Co., owning the Fairview group at Thunder mountain, says he has orders from Pittsburgh to start up work on an extensive scale.

LATAH COUNTY.

J. M. Scafford and sixteen miners are working the Gold Bug, near Princeton, Idaho, on the headwaters of the Palouse river.

LEMHI COUNTY.

G. Sinclair, managing the Old Italian group of mines, says that another ledge has been found.

OWYHEE COUNTY.

The Avalanche says work on the properties of the Tibo-Bluebird Co. in Pixley Basin will be begun; the title to the property passes from Messrs. Ballard, Miller & Watts to a local company, capitalized at \$500,000. The Bluebird mines are in the Steele mining district on the southeastern end of the Owyhee range, 25 miles from Silver City.

A rich gold strike is reported at the Poorman mine. In 1866 the cost of mining and milling the ore in Silver City was \$66.07 per ton. It can now be done for one-tenth of that.

MONTANA.

BEAVERHEAD COUNTY.

Citizens of Bannack want some one with money to take hold of the property of the Western Mining Enterprise Co., which, it is said, consists of several gold-producing claims and a 20-stamp mill. The property is near Bannack.—The owners of the Polaris mine expect to sell the property to a New York company.—Two nuggets, valued at \$40 each, were found in French gulch recently. Several smaller nuggets were also found. It is said that the gravel is yielding \$50 per day.

DEER LODGE COUNTY.

The Inter-Alta M. Co., at the head of Gold creek, 10 miles from Pioneer, will develop the mine. The property now has two tunnels about 90 feet in length, both on leads 2 feet in width, each bearing a pay streak averaging 12 inches, from which assays give \$300 gold.

FERGUS COUNTY.

At Yogo, pending the final arrangements of the settlement whereby the Mc-

Lure syndicate secured the Burke and Sweeney sapphire mines for \$50,000, the working force has been laid off; operations are at a standstill. It is thought that work will be conducted on different lines under the new ownership.

FLATHEAD COUNTY.

(Special Correspondence).—The Blacktail G. M. Co. is running ten stamps full time and doing nicely. About thirty men are employed.

The American Kootenai and the Mother Lode properties are doing nothing, owing to some Eastern influence.

The Brick & Brannigan 10-stamp mill is running regularly, as well as the mines.

The Libby M. Co. mill will be in operation July 25; sixteen men are employed at mine and mill.

The Standard group is being worked is making a good showing.

The Way Up people have lost their building by fire, but are working the mine and rebuilding.

Considerable activity here and interest centered on methodical and practical milling, which heretofore seems to have been neglected. A complete assay outfit on the Blacktail has demonstrated many points heretofore disregarded, and the present management is thorough and painstaking.

Cabinet, July 9.

GALLATIN COUNTY.

Trail Creek reports work being pushed on the properties owned by the Amalgamated Co. It is probable the name of the new town will be Storrs.

MADISON COUNTY.

A. C. Sanders has taken a lease on the Grub Stake mine, near Pony, and has struck the ledge, which he is cross-cutting.

L. Cartier has sold the Toledo mine, near Sheridan, for \$40,000 cash. The new owners will renovate the concentrator and smelter. The Montana mine, 10 miles from Sheridan, is being worked under the supervision of F. Wright.

PARK COUNTY.

The Climax group is transferred to H. J. Miller, preliminary to the organization of a company at Livingston.

The Bear Gulch Co. has expended \$200,000 in development work. A cyanide plant has been decided upon. The foundation for the new 40-stamp mill is completed.

SILVER BOW COUNTY.

For the year ending June 30, 1902, some of the Butte mines give returns as follows:

Boston & Montana M. Co.—Expense of mining, transportation and treatment, interest and cost of selling copper, \$6,066,002; gross receipts from sales of copper, silver and gold, \$7,705,697; net proceeds, \$1,639,695.

Anaconda Copper M. Co., operating the Anaconda, St. Lawrence, Never Sweat, Mountain Con., Green Mountain, Bell and High Ore mines: Number of tons of ore extracted, 984,958; gross yield or value per ton, \$10.66; cost per ton for extracting ore from mine, \$3.80; total cost for extracting ore, \$3,742,312.20; place of reduction, Anaconda, 27 miles distant; cost of transportation per ton, 5 cents; total cost for transporting ore, \$147,743.77; actual cost of reduction per ton, \$3.32; total cost of reduction, \$3,267,182.32; amount of money expended for necessary labor, \$3,860,789.41; money expended for necessary machinery, \$3,143,705.11; freight, \$147,743.77; marketing, including seaboard charges for refining and selling, \$2,052,105.58; net proceeds, \$1,289,610.03.

Butte & Boston M. Co.—Number of tons extracted from Silver Bow No. 1, Silver Bow No. 3, East Gray Rock and Berkeley mines, 175,719; yield per ton of this ore, \$8.13; number of tons extracted from the Blue Jay mine, 13,780; yield per ton of this ore, \$10.60; total tons extracted from all these mines, 189,499; cost per ton for extracting from the four mines mentioned, with the exception of the Blue Jay, \$3.83; total cost for extracting ore from these mines, \$672,551.75; cost of transportation per ton, 18 cents; total cost for transportation of this ore, \$32,980.76; cost of reduction per ton, \$2.13; total cost of reduction, \$375,437.88; cost per ton of extracting ore from Blue Jay mine, \$6.94; total cost for extracting ore from this mine, \$95,202.37; cost per ton for transportation, 26 cents; total cost of transportation, \$29,285.64; total cost of extracting ore from all of the Butte & Boston mines, \$767,754; total cost for transporting ore, \$36,523.11; total cost of reduction of ore, \$404,723.20; amount of money expended for labor, \$709,689.73; expenditure for supplies, \$462,787.91; selling and marketing, including seaboard charges for refining, \$199,961.63; net proceeds, \$166,138.87.

Colusa-Parrot M. Co.—Mines operated, Burt, Woolman, Home, Original, Stewart, Dives, Colusa-Parrot; gross yield per ton, \$9.15; ore extracted, 276,926 tons; cost per ton for extracting, \$3.73; total cost of ex-

tracting, \$10,348.48; cost of transportation, 23¢ cents per ton; total cost of transporting ore, \$65,026; cost of reduction per ton, \$3.75; total cost of reduction, \$10,390.66; expended for labor, \$663,860; cost of supplies, \$370,988; net proceeds, \$397,475.

The net proceeds of the Gagnon mine, Colorado M. Co., as reported by Agent A. Husband, were \$152,249.22; number of tons extracted, 170,325; gross yield, \$925,706.41; total cost of extracting ore, \$506,808.74; total cost of transporting same, \$27,960.91; cost of reduction, \$265,441.54; net proceeds, \$152,493.22.

Parrot M. Co., operating the Parrot, Bellona and Little Mina mines: Gross yield, \$1,261,772.15; cost of production, \$684,154.36; net proceeds, \$577,617.

Snobomish and Tramway mines, by J. S. Harris, receiver: Net proceeds, \$70,849.

Onelda mine, owned and worked by W. W. Wilson: Net proceeds for year, \$1120.

Nova mine—Cost of reduction per ton, \$3; number of tons of ore extracted, 1000; expended for labor, \$2200; cost of supplies, \$2600.

W. H. Johnston, secretary Washoe Copper Co., operating the Moonlight and Cambers mines, stated that during the past year there were no net proceeds from these mines on account of the construction of the new reduction works at Anacoda.

Alice M. Co.—Statement by Supt. T. W. Buzzo: Total expenses for year, \$61,811; sold 5265.1 tons ore, value \$60,598; loss for the year, \$1213.

Lessees of silver and gold mines near Wakefield are pleased that the East Helena smelter is to resume operations.

J. J. Bullard has handed his North Moccasin mountain property to F. J. Hazen of the Great Northern M. Co. for \$50,000.

F. Farrell, who has spent \$1,500,000 in developing his claims in the East Butte district, will soon begin the erection of a 1200-ton smelter. A new process is to be employed, by which concentration by water will not be necessary.

YELLOWSTONE COUNTY.

A. P. Hart tells of the discovery of a 60-foot vein of copper-bearing ore on Credential creek, between Sunlight and Cooke City, which assays 15% copper.

NEVADA.

CHURCHILL COUNTY.

Engineer Tilton of the Southern Pacific Co. is going over proposed routes for a railroad from some point on the Southern Pacific to the salt deposit owned by the Independent Salt Co. in Churchill county. This company was organized by Swift, Armour & Cudahy to fight the salt trust. It has acquired 14,000 acres of salt deposit in Churchill county. The shortest route is said to be one from Woolsey, a siding on the main line of the Central Pacific 9 miles east of Lovelock. The route would tap the Cottonwood iron mines and other mineral territory. Another route is from Winnemucca. The distance—90 miles—is the greatest drawback, but this is offset by the fact that the road would pass over a comparatively level country.

HUMBOLDT COUNTY.

A 6-inch streak of ore in the Sheba mine, near Unionville, is said to show values ranging from 80 to 100 ounces in silver and \$10 per ton in gold.

The sulphur mining company operating near Black Rock has declared a dividend of 15 cents per share.

LINCOLN COUNTY.

The first of the new improvements at Bamberger's De Lamar mines will be \$30,000 worth of electric material for an electrical plant 8 miles below Calientes, and an additional battery of Chilean mills, which will permit the handling of 300 tons of gold-bearing ore daily.

The S. L. Tribune has advised of the final payment of \$600,000 by the De Lamar Mines Co. to Capt. De Lamar, but two formalities remaining unfinished, the ratification of transfers that have been agreed to by the directors of the April Fool and Boston and De Lamar companies in Salt Lake City. It is said that the articles of incorporation in which the capitalization is fixed at \$5,000,000 will be filed August 1st.

NYE COUNTY.

Manager Curtis of the Fraction Co. has bought the Magpie, Nancy Hanks, Rex and Laura B. mines at Ray and will develop the property.

W. H. Holabird, representing the Southern Pacific Co., has made a proposition to Tonopah to build and operate a standard gauge railroad from a point near Rhodes station, on the Carson & Colorado Railway, to Tonopah, provided the mining and sundry interests of Tonopah subscribe to bind themselves to pay upon the completion of said railroad \$250,000 to the Southern Pacific Co. The Southern Pacific says it will also add a third rail to the Carson & Colorado Railroad between

Rhodes and Mound House. The Southern Pacific Co. agrees to begin work thirty days after the money has been guaranteed.

G. B. Francisco has sold the Peacock mine, in southern Klondike, to T. L. Oddie for \$12,000.

The permanency of the mines at Weepah is prophesied. The Philadelphia Co. has several men at work, and as depth is gained coarse gold is found in the ore.

Stone Cabin district is apparently a parallel belt to the Tonopah range. The formation is porphyry, carrying gold values.

The Tonopah Extension M. Co., owning a group of claims 5 miles north of Tonopah, has a contract to sink a main working shaft 500 feet. G. T. Holladay is Supt.

The Tybo M. & R. Co. is shipping ore to Salt Lake.

ORMSBY COUNTY.

A small shipment of molybdenite was made last week from the Saxton-Cameron mine, 50 miles south of Carson, to the refinery in Connecticut.

STOREY COUNTY.

The new electric pumps to be installed on the 2150 level of the C. & C. shaft of the Con. Virginia M. Co. are expected next week. There are three of them—Reidler pattern, weighing, without the operating machinery, 260,000 pounds, and costing \$50,000. About Nov. 1 it is expected they will begin draining the mine down to its 2500 level, or bottom of the shaft. This will be an important point in the drainage of the Comstock, and other mines along the lode are expected to join in and assist, thereby getting at their own lower levels. The entire vertical depth of the workings of the Comstock is 3300 feet.

WASHOE COUNTY.

Supt. Parry has added twenty men to the working force of the Pacific Con. M. Co. at Pyramid.

Supt. J. W. Hopkins of the Great Western mine, near Reno, has fifteen miners developing the property.

J. K. Miller has handed the Boston group of mines, 110 acres, near Reno, at \$25,000. The property lies on the contact between the lime-porphry of the Wedekind district and the granite country rock.

WHITE PINE COUNTY.

The North Mountain M. Co., Cherry creek, is pushing work under the management of W. H. Brown.

Ely says that the Chairman Co. is now in debt to the extent of \$40,000 after expending \$500,000, which will occasion no surprise where the reasons for this condition are well known. The stockholders, however, should not be discouraged by the mistakes which have been made in the past. They have an excellent property.

Work on the railroad from Copper Flat has begun. The New York & Nevada C. Co. is grading for the new line.

Experiments by Mill Supt. Wickham in treating the Chairman ores have proven satisfactory; the six leaching tanks and two of the settling tanks above, capacity 150 tons each, are in use; assays of the tailings dumps show values of less than 75 cents.

NEW MEXICO.

The Steins Peak G. M. & M. Co. has incorporated; O. M. Segar, W. E. Allen and J. M. Abbott; headquarters, Lordsburg.

OREGON.

BAKER COUNTY.

Bourne reports strikes in the Cracker-Oregon property. Above the millsite the company intends to erect a plant for power and treatment.

The Crown Point owners have been making a resurvey of their property.

The Badger concentrating mill is completed.

W. H. Potter is putting in twenty new stamps at the quartz mill of the North Pole mine.

C. Feldenheimer, manager Pomeroy Dredger Co., on Burnt river, tells the Baker City Democrat that they will start the dredger to work.

Supt. Walker reports rich ore found in the crosscut of the California mine at Sumpter. Supt. Addoms has begun work on the Alpine group.

GRANITE COUNTY.

Near Granite piping for the Alamo mine is being laid. A slight error on the part of the engineer who made the survey for the tunnel has worked hardship on the management, as the tunnel was made to run almost parallel with the lead. This will necessitate over 400 feet more tunnel than was at first supposed. Ht Supt. McGuigan says he prefers that to making a bend in the tunnel.

JOSEPHINE COUNTY.

The Golden Drift M. Co. is damming Rogue river 3 miles above Grants Pass. The dam is built one-third of the distance across the river.

Many Josephine prospectors and miners are turning their attention towards platinum. The Welsbach Co. of Philadelphia has men in the placer fields of the Illinois river looking for that metal. They have patented machinery of their own design and hope to secure enough to partly supply the needs of their company.

SOUTH DAKOTA.

CLARK COUNTY.

F. R. Byrnes, general manager, is building a 40-stamp cyanide mill on the Penobscot, at Garden City.

PENNINGTON COUNTY.

W. Hendricks reports finding tellurium ore on the Enterprise claim, near Hill City.

The Columbia M. Co., near Rochford, will put in a new steam hoist, air compressor and machine drills.

At Keystone the Red Canyon Stucco Co. is organized to build and equip a large mill for grinding and calcining the native gypsum.

UTAH.

The State Board of Equalization furnishes the following valuation of some Utah mines for assessment purposes:

NET PROCEEDS OF MINES, 1902.

Utah Sulphur Co.	3,750
Pleasant Valley Coal Co.	53,236
Carisa Copper & Gold M. Co.	65,579
Nephi Plaster & Mfg. Co.	5,000
Gemini M. Co.	84,619
The Utah mine.	12,000
Mammoth M. Co.	54,169
Webster M. Co.	721
Annie Laurie M. Co.	126,927
Highland Boy Gold M. Co.	303,756
Ivanhoe M. Co.	772
Pinyon and Pinyon Extension.	479
Quincy M. Co.	716,935
Daly-West M. Co.	622,500
Silver King M. Co.	1,300,000
Ontario Silver M. Co.	134,972
Chloride Point Con. M. & M. Co.	230
Consolidated Mercur G. M. Co.	295,967
Hidden Treasure M. Co.	457
Ophir Hill Con. M. Co.	54,853
Uintah Copper Summit Co.	16,932
Gilson Asphaltum Co.	26,405
Yankee Con. M. Co.	36,243
Uncle Sam Con. M. Co.	29,340
Centennial-Eureka M. Co.	211,000
May Day M. Co.	18,000
Bingham Copper & Gold M. Co.	53,514
Sacramento Gold M. Co.	15,000
Utah Eastern M. Co.	15,000

Total proceeds, 1902.....\$4,258,356
Total proceeds, 1901.....3,133,265

Increase.....\$1,125,091

BEAVER COUNTY.

Construction work upon the power plant in Beaver canyon planned by the Majestic Co. has begun. W. M. White, the company engineer, says the approximate cost of the three dams will be \$50,000, designed to develop 1800 H. P. Dams Nos. 1 and 2 will be 290 feet long, 300 feet thick at the base, 10 feet thick at the top and 76 feet high. Dam No. 3 will be 144 feet thick at the base, 10 feet at the top and 36 feet high. President Lewis of the Majestic Co. says it is the intention to convey the current to Copper gulch, 50 miles, and furnish 500 H. P. to the Cactus, Manager Newhouse having contracted to take this amount of power for his mine and concentrator.

JUAB COUNTY.

The Tribune says both mine and mill at Tesora of Tintic have indefinitely closed down and will remain so until otherwise ordered by the Bingham Con. M. Co., which is now in possession of practically all the shares.

Water has compelled cessation of work in the South Swansea of Silver City.

O. Fairchild, superintendent Manhattan at Mammoth will cut out a station at the top of the 100-foot winze in the tunnel, preparatory to installing a hoist.

SUMMIT COUNTY.

(Special Correspondence)—At 11:30 last night the magazine on the 1200-foot level of the Daly-West mine exploded, killing twenty-nine miners in the Daly-West and six in the Ontario. Eight men got out through the Anchor tunnel. The cause of the explosion was J. Burgy, who went into the magazine with a lighted candle. His body was blown to pieces. The gas killed the others. The shock of the explosion was felt 4 miles away. It flung a horse against the wall of the mouth of the Ontario tunnel, 2 miles off, killing him. Considerable true bravery was shown by the rescuing party that was immediately organized. All the first crowd of rescuers were overcome by the gas, but were resuscitated, and the work of rescue went on until all who could be reached were

brought out and the bodies of all the dead procurable brought to the surface. Two of the rescuers—McLaughlin and Eckstrom—lost their lives saving others. The body of the latter was left in the mine.

The men who were brought out say that there was little smoke or fumes; that the deadly gas did not thicken the air, and that several did not realize that they were being suffocated.

Park City presents a mournful sight this morning, with the dead bodies laid out, and the bitter grief of the relatives and everybody in the place. All work in the mine is of course stopped until the deadly gas is cleared out.

This is the worst mining accident in Utah since the terrible loss of life at Schofield, which was a dust explosion.

Park City, July 16.

For 161 tons ore treated at the furnace of the American Co. at Murray, the Silver King of Park City got nearly \$27,500 net, an average of 270 ounces silver, 40% lead, 9% copper, \$18 gold per ton.

The new steel gallows-frame and tramway, which has been provided with a new cable, are in use at the Silver King, Park City.

The new mill on the property of the Sacramento Co., at Park City, has begun the precipitation of gold.

WASHINGTON.

KING COUNTY.

The United States-British Columbia Corporation has been formed in Seattle to mine coal, iron, copper and gold and to bore for petroleum in Washington, British Columbia and Alaska. The company is composed of Seattle and British Columbia men.

YAKIMA COUNTY.

At North Yakima, the Yakima Reduction Co. has incorporated and will put in a reduction plant.

WYOMING.

CARBON COUNTY.

J. C. Miller, president Ferris-Haggarty M. Co., says that hereafter the mine will be operated from the mouth of the tunnel. The concentrator will be a 500-ton plant and will be placed about 1 mile below the mouth of the tunnel. The estimated cost is about \$100,000. It will be run by electricity, the power plant being located at the coal banks, 15 miles distant. The company is under contract to deliver to the Tramway Co. 200 tons of ore each day and is getting ready to carry out its agreement. Forty men are employed at the mine. All the machinery, buildings and everything used at the shaft will be moved to the mouth of the tunnel and future operations conducted from that point.

FOREIGN.

BRITISH COLUMBIA.

Phoenix reports orders from J. P. Graves, general manager Granby Con. M., S. & P. Co., to close the company's mines there. Over 400 men are affected by this order to close. The Granby smelter has not blown in since it closed for the Dominion day holiday, and 250 men are affected there. This is the first time in five years that these mines have closed. Lack of coke at the company's smelter is the cause of the cessation of operations at mines and smelter, which is occasioned by the strike at the Fernie mines of the Crow's Nest Coal Co. The officials of the mines are in hopes that the strike at Fernie will shortly be adjusted, so that work can be resumed at an early date. No ore is being sent out from the Mother Lode mine, in Deadwood camp, which is closed, and that company's Greenwood smelter is also blown out. The smelter at Boundary Falls is still running, and has a supply of coke sufficient to last another week, when it also will be forced to close if no more coke is obtainable. The Sunset and Snowshoe mines, which ship to this smelter, are still running as usual, and the latter is expected to continue anyway, as there is a large amount of development in hand, aside from the shipping of ore.

The Cariboo Hydraulic Co. has sent part of its cleanup to the bank at Ashcroft. The company used to ship its gold to New York, but has decided to forward the gold to Vancouver. By this means it receives the same price as New York would give and saves freight and other charges.

The Velvet mine at Rossland is to have a concentrating plant. The management expects to ultimately have 250 men employed.

D. H. Wilcox, foreman Prince M. Co., in Revelstoke, says that they have a body of 6 feet of ore carrying copper, silver and gold.

Manager E. B. Kirby says the Center Star and the War Eagle at Rossland will soon be shipping again on about the same basis as before the strike of last year. When production stopped the War Eagle

was sending out about 150 tons of ore a day and the Center Star about 300 tons. The lowest cost the Center Star was able to maintain for mining its ore was a little over \$2.50 a ton. Of that, \$1.44 was charged against development.

At Marysville G. W. Hull, general manager Sullivan Group M. Co., is pushing work on the smelter. The Sullivan mine will be opened up.

At the Arlington mine, Slocan, the force may be further reduced. The management is endeavoring to secure better rates from the Hall Mines smelter for the treatment of its ore, claiming that the present charges are excessive.

It is locally stated that the North Star mine, East Kootenay, had to pay \$101,336 17 for the freight and treatment of \$164 838 72 worth of ore. The total expense of mining, maintenance, freight and treatment exceeded the gross value of the ore extracted by \$76 21. Miscellaneous receipts, however, allowed a small profit of \$8701 97.

The Lenora mine is stated to be shipping 200 tons of ore daily to the Crofton smelter, which begins work next month.

The Northwestern Development Syndicate, Hancock, Mich., will put in a 10-stamp mill and an aerial tramway at the mines of the Camborne group. A sawmill will also be erected for the mines and the adjacent town of Goldfields. The Gold Finch claim adjoining is bought by the syndicate for \$25,000.

The Cariboo Con. hydraulic mine at Bullion is running with a full force of men.

Manager Hull has shut down the Marysville smelter, East Kootenay. At the North Star mine, East Kootenay, there are seventy men employed.

The Montreal & Boston Copper Co.'s reconstructed smelter at Boundary Falls is in operation.

The Glenn iron mine is at Cherry Bluff, near Kamloops. The product of this mine is 66 83% metallic iron, the annual output from 500 to 2000 tons conveyed by aerial tramway to the C. P. R. tracks. This ore has been used for fluxing purposes by smelters at Tacoma, Revelstoke and Nelson.

CHINA.

From Niu Chwang Consul H. B. Miller writes that there are no quartz mines in operation in Manchuria, excepting those operated by the Chinese with their own methods, which consist in roasting the ore, grinding and then washing it. This is carried on in a very rude way with both silver and gold; but all the appliances are so crude as to indicate little as to the value of the mines. Nothing has been done except incidental prospecting. Mining in the immediate vicinity of Port Arthur can only be carried on by permission of the Russian Government.

All of Manchuria, from Port Arthur north to Siberia, is mineralized; gold, silver, copper, iron, asbestos, anthracite and bituminous coal have been discovered and worked by the natives.

Gold placers have been worked for ages on the waters of the Yalu and Sungari rivers, and are still operated in very crude ways, without pipes, giants or water pressure.

Gold and silver quartz have been hammered out and roasted in mines in these sections for forty years or more, but no reliable prospecting has yet been done, and foreign mining experts have never given the country even casual investigation.

Consul Miller says he has met and interviewed several Chinese, who are operating mines on the headwaters of the Yalu, who tell him that many quartz ledges carrying gold have been discovered and worked in a crude way without the use of drills and powder, and that from the richest they secured \$250 to the ton.

The Chinese government has recently issued a new set of mining regulations that will have a tendency to retard rather than increase mining in China.

An Anglo-French syndicate, registered in London, and represented in China by E. Roebber, the French Consul General, has secured a mining concession in the province of Yunnan. The contract has been signed by the British and French ministers. The concession runs for sixty years, with the right of further extension. It comprises eighty-five mines producing coal, copper, nickel, quicksilver, and tin. A royalty of 5% is to be paid to the Chinese government. Twenty-five per cent of the net profits will also go to the Chinese government, 10% to the provincial government and 65% to the shareholders. The concession includes buildings, mines, railroads, roads and canals.

MEXICO.

SONORA.

W. E. Pomeroy, Supt. Yaqui Copper Co.'s mines, W. C. Greene president, W. P. Harlow general manager, at Saquai de Batuc, on the Yaqui river, 125 miles from Hermosillo, says there are eight tunnels,

two shafts and numerous crosscuts. He has ninety men employed and is under instruction to put more on as fast as room can be made for them.

The Anglo-American Co. that lately bought the Mulatos group is preparing to build a 1000-ton smelting plant. An appropriation of \$300,000 has been made by the company to build a road from the smelter, near the mines, to the nearest point on the Sonora Railway.

The Green Con. at La Cananea has three converters at work. The company is shipping at the rate of 3,000,000 pounds of blister copper a month, equivalent to about 6,000,000 pounds of matte, as the Cananea matte did not go more than 50% copper.

A. W. Burchard, manager Greene Consolidated, is locally credited with the statement that the company has in one month reduced the cost of producing one pound of refined copper from 7 1/10 cents to 6 1/10 cents.

The Cananea Co. is producing copper at the rate of 1,000,000 pounds per month. Five furnaces and three converters are in operation; three new furnaces and two converters are being erected. Work has begun on a 500-ton concentrating plant.

NORWAY.

The Edison magnetic ore extraction process is to be installed by English steel manufacturers in the iron ore districts of Norway. Arrangements have now been completed for the erection of a complete magnetic apparatus at Dunderland. In this district there are deposits of iron ore averaging 40% of metal to 60% of gangue. It would not be lucrative to ship the raw ore to the smelting furnaces of England, but it will be possible to work the ore profitably by the Edison extraction process. Each unit of the apparatus contains two 250 magnets of varying powers, and is capable of dealing with a ton and a half of crushed ore per hour.

SUMATRA.

W. D. O'Brien has returned to San Francisco from the island of Sumatra, where he was in the employ of a Dutch mining company that is putting in hydraulic mining machinery. He says the gold is found in the quartz. There is plenty of water power on the island. Rain falls throughout the year. The interior is covered with a high range of mountains and there are ample facilities for water storage. For this reason hydraulic mines may be found in large numbers. Quartz mines in certain localities have ore yielding \$36 per ton. The process of operation is difficult on account of the lack of desirable laborers. Chinese coolies are imported, who are paid 10 cents per day and found. The white population of the whole island is less than 500.

YUKON TERRITORY.

Now that the Yukon gold royalty has been reduced to 2 1/2%, there is no longer exemption allowed up to \$25,000 of output in the case of hydraulic properties.

Personal.

JULES LA BARTHE is Supt. Trail, B. C., smelter.

W. L. WATTS is examining property in Sierra Co., Cal.

T. H. WILKINS is manager Cedar Creek mine, Colfax, Cal.

E. M. RAY of Colorado is visiting Thunder Mountain, Idaho.

J. F. KEMP of Columbia College, is visiting Park City, Utah.

S. M. NOEL is superintendent San Juan M. Co., Silverton, Colo.

J. W. DUNLAP is Supt. Basin Con. gravel mine, Deadwood, Cal.

V. V. CLARK has gone from Albuquerque to Woodbury, N. M.

A. H. WETHEY, Supt. Butte, Mont., Reduction Works, is in Chicago.

J. H. TERRY, manager Sunnyside mine, has returned there from Denver.

J. WITHERLAY is superintendent Socorro mine, Wickenburg, Arizona.

JOHN MOLDER has been re-elected Supt. Home Copper Co., Morenci, Ariz.

FRANCIS WATSON is general manager The Fisher Maiden mine, Rossland, B. C.

W. G. FOSS is general manager Wisconsin M. Co., Grand Encampment, Wyo.

PATRICK CLARK has again resumed management of the Republic, Wash., M. Co.

P. T. NEWITT has been appointed Supt. Henson Creek L. M. Co., Lake City, Colo.

H. W. BRITT is resident manager the Copper Age M. & S. Co., Encampment, Wyoming.

G. R. NICKETY, manager Britannia mine, Butte, Mont., has returned from Wisconsin.

GEORGE M. SEELEY has resigned the superintendency of the Irondale Lead Co., Irondale, Mo.

W. J. ELMENDORF, of Denver, is appointed superintendent Sullivan smelter, Marysville, B. C.

SUPT. E. R. ABADIE of the Champion mine has returned from San Francisco to Grass Valley, Cal.

F. MOREHOUSE is manager Lady Curzon group, owned by the Beaver C. & G. Co., Milford, Utah.

D. G. C. MACNEILL has returned to Colorado from a nine months' stay in Guanajuato, Mexico.

W. B. McDONALD, the new manager of the Arkansas Valley smelter, Leadville, Colo., has taken charge.

R. H. CAMPBELL, formerly of Shasta Co., Cal., is examining placer property at Eureka and Fraser creeks, B. C.

SUPT. N. S. BERRY of the United Globe mines has returned to Globe, Arizona, from Grant county, N. M.

W. L. ROBB has been elected professor of physics and electrical engineering at the Rensselaer Polytechnic Institute.

DR. JNO. H. TUCKER has resigned the superintendency of the Germania smelter, Salt Lake, Utah, because of ill health.

ELL TORRANCE of Minneapolis, Minn., writes that he is a director and stockholder in the Feather River Con. M. Co.

J. R. GIFFORD is general manager Hall mines, Nelson, B. C., and consulting engineer Highlander mine, Ainsworth, B. C.

JOHN ROSS is now general foreman of the Creston mine at Minas Prietas, Sonora, Mexico, succeeding Thos. Bentley.

J. P. EVANS and BRUCE TRAYLOR of the Colorado Iron Works Co., have returned from San Francisco to Denver, Colo.

ERNEST GAYFORD, late Supt. Horsehoe, Nev., mill and mine, goes as metallurgist Colossus G. M. Co., Charlotte, N. C.

ROBERT J. COLEMAN, manager Newhouse properties, has returned to Salt Lake, Utah, from Tintic, and goes thence to Mexico.

ASA BALDWIN has resigned the superintendency of the Ohio-Deadwood Co., Lead, S. D. His successor is I. P. Murphy of Toledo, O.

W. F. STAUNTON, Supt. Congress, Arizona, gold mines, will assume the superintendency of the Tombstone Con. mines, Tombstone, Arizona.

A. C. SPENCER is in charge of the Government geological work, Grand Encampment, Wyoming, under the general direction of S. F. Emmons.

J. J. SHINN has been appointed general manager Stormy Petrel M. & M. Co., Horseshoe mining district, Park county, 8 miles from Leadville, Colo.

GEORGE GUNN, for many years buyer of ore for the East Helena, Mont., smelter, has gone to Salt Lake City, Utah, to take a similar position.

WALLACE MCGREGOR returned to Berkeley, Cal., from a year's sojourn at Costa Rica mines on the 13th, and left on the 16th for East Braintree, Mass.

T. R. JONES will be succeeded in the Utah management of the American Smelting & Refining Co. Aug. 1 by Chas. W. Whitley of East Helena, Montana.

E. A. COLBURN is president and general manager; H. C. Colburn, master mechanic; C. H. Dudley, secretary and treasurer, Ajax G. M. Co., Victor, Colo.

H. M. CLAGETT, formerly Supt. at Vacas, Durango, Mexico, has been appointed Supt. of the mill and smelter of the Pride of the West M. & M. Co. at Washington, Ariz.

HENRY BRADY, melter of the United States Mint, Denver, Colo., since 1897, has resigned. It is understood that J. W. Milsom of Canon City, Colo., will be appointed his successor.

R. B. MCCONNEY, mechanical engineer, for several years with the Mine & Smelter Supply Co. of Denver, Colo., has resigned his position with the above firm and accepted a similar one with the Holthoff Machinery Co. of Milwaukee.

THOMAS MILLS, connected with the Calumet & Hecla for many years before the consolidation, and who has been underground captain since 1872, has retired on account of the state of his health. He has been succeeded by James Wilson, his former assistant.

WALTER VROOMAN, of Missouri and Kansas, has a plan to "formulate a Colorado branch, purchase and develop mines, erect a smelter for the treatment of the ores and also to buy and establish co-operative stores" in Colorado, and will begin work in Colorado, he says, about Sept. 1.

L. WEATHERHEAD, of Missoula, Mon-

tana, has returned to South Africa. He says that Americans are numerous there and that American machinery and American operatives are in demand. He does not think that British rule will improve conditions, but is going back just the same.

J. B. GALLAGHER, late superintendent sampling mill at Washoe smelter, Anaconda, Montana, is now in charge of the Colorado smelter, owned by the Anaconda Co. in Butte, succeeding R. F. Pierce, who resigned to take a position in the New York office of the Colorado M. Co. S. A. Gormerly succeeds Mr. Gallagher as superintendent of the sampling mill.

Commercial Paragraphs.

THE Burt Mfg. Co. of Akron, Ohio, have furnished two large Cross oil filters to the U. S. Steel Corporation for their works at Youngstown, Ohio, making 108 of their filters now in use by that company.

AT the air drilling contests at Idaho Springs, Colo., during the week ending the 7th inst., the Leyner drill was used by the teams who won the first and second prizes, the first prize winners putting one 9-foot down and one 9-foot upper into the granite wall in 42 1/2 minutes, the second prize winners drilling the same in 44 1/2 minutes.

THE Sturtevant Mill Co. of Boston write that owing to the increased demand for its output they have greatly enlarged their plant, which includes a large Green engine, latest high speed lathes, boring mills, planers, shapers, etc., enabling them to offer to their patrons a better service than ever before. Their thoroughly equipped wood working shop is exclusively adapted to the manufacture of their toggle screens, the demand for which has increased so rapidly that their new works are just beginning to fill orders secured in the early spring. They say that by the middle of summer they will be able to make quick deliveries on nearly all their productions. One of the novel features of their plant is its sampling department. The company have found that working tests on varying material often saves a great expense to prospective purchasers, as the exact results there attained assure the buyer of just what each machine will do when working for him. This plant is seldom out of use. They say: "Our patrons are cordially invited to make use of this sampling plant."

THE A. Van der Naillen School of Engineering, 113 Fulton street, San Francisco, Cal., recently held its thirty-eighth annual examination in practical, civil, mining, electrical and mechanical engineering and surveying, architecture, drawing, assaying, cyaniding and metallurgy. The following were granted diplomas: Assayers—H. A. Kuns, D. Woodrun, H. B. Shaw, C. S. Bryant, H. C. Gentesche, W. T. James, C. L. Bosson, F. G. Blackburn, J. K. Wilson, F. S. Beckett, G. Messner, W. W. Thurston, T. J. Douglass, J. Sklower, R. Mawbray, C. W. Soule, D. J. Mahoney, L. L. Mann, G. R. Huggins, E. Williams, G. Conlin. Surveyors—G. Gibson, M. J. Blake, G. W. Grove, G. J. Grinnell, G. V. Nichols, A. E. Duffey, R. J. Barr, C. Goerl, F. Juhl, U. Coffman, R. C. MacLachlan, A. Watson, A. Dumas, W. H. Warnecke. Mining Department—G. A. Ray, S. M. Waterman, F. A. Horville, J. L. Hutchinson, H. Newman, M. C. Kerr, F. M. Lyle, D. W. Lyon, W. H. James, J. A. Shields, C. E. Sloan, B. G. B. McDowell, J. H. McDowell, W. O. Maxwell, E. F. Beck, O. W. Alderton, F. W. Saunders. Draughtsmen—R. Keeler, G. Fee, R. W. Cudworth, W. K. Blackburn, S. I. Casella, J. F. McLaughlin. Electrical Department—W. R. Dunbar, H. E. Shuck, T. J. Zehmdner, P. L. Gedney, D. McDougall, W. T. Rutledge, R. Dewart, E. L. Faust, A. W. Hunt, V. Urban, H. G. Schemel, A. Mauser, J. W. Dooley, F. A. Dooley, A. H. Kennedy, C. W. Cooper, T. C. Thayer, H. B. Patterson, R. Urquhart, C. T. McKenzie, H. A. Smith, J. T. Worthington, F. W. Mielenz, F. Bond, F. R. George, E. Kreft, R. L. Cathy, E. R. Foster, E. Schlesinger, L. A. Hedger, J. Minor, J. P. Gericke, H. F. Fahs, E. P. Mann, O. G. Wilkes, L. E. Wilkes, E. Mayer, L. T. Russell, S. C. Mills, E. M. Hengell, H. Piggott, J. F. Echer, D. C. Rudolph.

THE Denver Engineering Works Co. of Denver, Colo., has in process of construction a 10-stamp mill for R. B. Pratt, to be erected at Thomasville, Colo.; also a 40-stamp mill for the Penobscot M. Co., to be erected at Deadwood, S. D. Electric hoists under construction are as follows: Three 2 H. P. hoists, two 5 H. P. hoists, two hoists of 10,000 pounds capacity, and two 150 H. P. hoists for the Penoles mine in old Mexico; one 135 H. P. hoist for the Utah Fuel Co.; one 50 H. P. hoist for the Kendall G. M. Co., Montana; one special

50 H. P. hoist for the Montana Coal & Coke Co., Montana; one 50 H. P. hoist for the Northern Pacific Railroad Co.; one 5 H. P. hoist for Hendrie & Boltboff; one 5 H. P. hoist for the Mine & Smelter Supply Co.; one 100 H. P. endless cable, electrically driven winding engine for the Anaconda Copper M. Co. They also have one order for 300 tons of special castings for the Colorado Fuel & Iron Co., and another order for 30,000 pounds of castings for the new rolling mill to be erected at the Bessemer Steel Works. They write: "We have also recently shipped one set of 16x36 spring rolls and two sets new type 14x27 rigid rolls to the Columbus Skein & Iron Works, Columbus, Ohio; one complete mine timber framing plant, comprising timber framer, slab saw, wedge saw, swing cut-off saw, and automatic saw sharpening machines to the Allis-Chalmers Co., Chicago; one 25 H. P. electric hoist to the Candelaria M. Co., Mexico; one 15 H. P. hoist to Harron, Rickard & McCone, San Francisco; two complete sets of riveted steel jackets to the Birmingham C. & G. M. Co., Utah; thirty special butterfly valves to the United States M. Co., Utah; one 4x6 and one 9x10 steam hoist to Van Voorhies & Sanford, Mexico; one 5 and one 7 1/2 H. P. electric hoist to Parral, Mexico; one 3 H. P. induction motor to the Gold King Con. M. Co., Silverton, Colo.; three 8-foot flat rope sheaves for 4 inch and 5-inch ropes to the American Bridge Co.; one 135 H. P. electric hoist to the Commodore M. Co. We shall soon have ready for distribution our new electric hoist bulletin of thirty pages, illustrated, containing construction drawings of all the standard hoists; also our new electric rock drill bulletin will be ready for distribution Aug. 1st."

Catalogues Received.

The paramount excellence now expected in American machinery catalogues is fully sustained by General Catalogue No. 42 of the Stilwell-Bierce & Smith-Vaile Co., Dayton, Ohio, depicting in detail their pumping machinery. The 136 pages are interesting to any one in present or prospective use of such devices. The company will send the catalogue on request.

Roasting, smelting and refining are the main subjects treated in the 6th edition of Catalogue No. 5, issued in their usual sumptuous style by the Allis-Chalmers Co., Chicago, Ill. No finer work, typographically, is found in any of the high-class magazines, and the technical information and detail make the handsomely bound volume of 208 pages worthy a place on the shelf of anyone interested in the subjects treated.

Recently Declared Mining Dividends.

	Payable.
Golden Cycle Co., Colorado, 1 cent per share, \$11,250.....	July 25
Homestake M. Co., South Dakota, 50 cents per share.....	July 25

Obituary.

HENRY WILLIAMS, a leading Montana smelting man, died at Butte, Mont., on the 8th inst., aged 62 years.

New Patents.

DEWEY, STRONG & CO.'S SCIENTIFIC PRESS PATENT AGENCY, 330 Market St., S. F., has official reports of the following U. S. patents issued to Pacific coast inventors:

- FOR THE WEEK ENDING JULY 8, 1902
- 704,289.—BELL—S. J. Ashell, Deerharbor, Wash.
 704,438.—SASH FASTENER—A. Brander, Seattle, Wash.
 704,172.—INSULATOR—J. E. Calvin, Camptonville, Cal.
 704,173.—CAN BONY MACHINE—W. S. Case, Haywards, Cal.
 703,995.—GAS GENERATOR—Caton & Warring, San Jose, Cal.
 704,416.—ENDLESS CHAIN REEL—J. M. Dunaboo, Wood River, Cal.
 704,015.—SEMAPHORE—W. D. Farren, Danville, Cal.
 704,181.—BUILDING DAMS—A. D. Foote, Grass Valley, Cal.
 704,331.—TREE SUPPORT—S. T. Hall, Riverside, Cal.
 704,350.—WELL RIG—E. A. Hardison, Santa Paula, Cal.
 704,180.—HAND STAMP—L. J. Hendershott, Spokane, Wash.
 704,061.—HORSE HOLDING DEVICE—M. Lopicich, Sacramento, Cal.
 704,092.—AMMONIA COMPRESSOR—J. T. Ludlow, S. F.
 704,065.—WEIGHING APPARATUS—J. Manes, S. F.
 704,085.—CAR AXLE BOX—O. Newhouse, S. F.
 704,363.—SWITCH STAND—H. F. Ong, Wendling, Or.
 704,314.—ACCOUNT BOOK—C. K. Rosenberg, S. F.
 704,123.—LAIDDER—R. L. Scott, Arlington, Cal.
 704,129.—DELIVERY APPARATUS—Speedy & Campbell, Los Angeles, Cal.
 704,130.—CIRCULATOR—Speedy & Campbell, Los Angeles, Cal.
 704,137.—SEWING MACHINE—D. M. Smythe, Pasadena, Cal.
 704,280.—ROTARY ENGINE—A. T. Stimson, Eureka, Cal.
 704,405.—WATER WHEEL—S. M. Thurman, Yuma, Ariz.

Latest Market Reports.

SAN FRANCISCO, July 18, 1902.

METALS.

SILVER.—Per oz., Troy: London, 24 1/2 (standard ounce, 925 fine); New York, bar silver, 53c, refined (1000 fine); San Francisco, 53c; Mexican dollars, 44 1/2c San Francisco, 45c New York.

COPPER.—New York: Standard, \$11.40@11.65; Lake, 1 to 3 casks, \$11.95; carload lots, \$12.15; Electrolytic, 1 to 3 casks, \$11.95; carload lots, \$11.60; Casting, 1 to 3 casks, \$11.75; carload lots, \$11.50. San Francisco: \$11.00. Mill copper plates, \$17.00; bars, 18@24c. London: £53 2s 6d spot, per ton.

LEAD.—New York, \$4.12 1/2; Salt Lake City, \$3.60; St. Louis, \$4.00; San Francisco \$4.50, carload lots; 4 1/2c 1000 to 4000 lbs.; pipe 5 1/2, sheet 6, bar 5 1/2c; pig, \$4.75. London: £11 5s per ton.

SPELTER.—New York, \$5.12 1/2; St. Louis, \$4.50; London, £19 5s per ton; San Francisco, ton lots, 5 1/2c; 100-lb. lots, 6 1/2c.

ANTIMONY.—New York, Cooksons', 10c; Hallett's, 9c; San Francisco, 1000-lb. lots, 10c; 300 to 500 lbs., 11c; 100-lb. lots, 13@15c.

TIN.—New York, pig, \$29.00; San Francisco, ton lots, 31 1/2c; 1000 lbs., 31 1/2c; 500 lbs., 31 1/2c; 200 lbs., 32c; less, 32 1/2c; bar tin, 3 1/2c. London, £128 12s 6d spot.

PLATINUM.—San Francisco, crude, \$18.00 per oz.; New York, \$20.00 per Troy oz.

QUICKSILVER.—New York, \$48.00 large lots; London, £8 16s; San Francisco, local, \$47.00 per flask of 7 1/2 lbs.; Denver, \$51.00. Export, \$44.50.

BABBIT METAL.—San Francisco, No. 1, 10 1/2c.

ALUMINUM.—New York, No. 1, 99% pure ingots, 35c; No. 2, 90%, 30c to 35c.

SOLDER.—Half-and-half, 100-lb. lots, 20c; San Francisco, Plumbers', 100-lb. lots, 16 1/2c.

NICKEL.—New York, 55@60c per lb.

STRUCTURAL MATERIALS.

IRON.—Pittsburg, Bessemer pig, \$21.75; gray forge, \$21.25; San Francisco, bar, 3c per lb., 3 1/2c in small quantities.

STEEL.—Bessemer billets, Pittsburg, \$33 and \$34; open hearth billets, \$35.25; San Francisco, bar, 7c to 12c per lb.

CHICAGO CURRENT QUOTATIONS.

Bessemer.....	\$23.00@24.00
Foundry Northern 1.....	21.50@22.00
Northern 2.....	21.00@22.50
Northern 3.....	20.50@22.00
Southern 1.....	21.15@22.15
Southern 2.....	20.65@22.15
Southern 3.....	20.15@21.15
Forge.....	19.15@20.65
Charcoal.....	23.50@24.50
Billets, Bessemer.....	33.00@34.00
Bars, iron.....	1.80@1.90
Bars, steel.....	1.75@1.85
Rails, standard.....	28.00@30.00
Rails, light.....	34.00@40.00
Plates, boiler.....	1.90@2.00
Tank.....	1.75@1.80
Sheets, 26 store.....	3.25@3.40
No. 27.....	3.35@3.50
No. 28.....	3.45@3.60
Angles.....	1.75@—
Beams.....	1.75@—
Tees.....	1.80@—
Zees.....	1.75@—
Channels.....	1.75@—
Steel melting scrap.....	19.00@20.00
No. 1 railroad wrought.....	21.00@22.00
No. 1 cast, net ton.....	15.00@16.00
Iron rails.....	24.00@25.00
Car wheels.....	21.00@22.00
Cast borings.....	10.00@10.50
Turnings.....	14.00@14.50

CEMENT.—Germania, \$2.75; K. B. & S., \$2.75; Hewmore, \$2.65; Trowell, \$2.65; Portland, \$3.25 per bbl.

LIME.—Santa Cruz, \$1.70; Roche Harbor, \$1.65 per bbl.

LUMBER.—(Retail): Pine, ordinary sizes, \$19.50@22.00; extra sizes higher; redwood, \$21.50@22.00; lath, 4 feet, \$4.00 @4.25; pickets, \$19.50; shingles, \$2.35 for No. 1 and \$2.00 for No. 2; shakes, \$13.50 for split and \$14.50 for sawed; rustic, \$26.00 @32.00.

NAILS.—Per keg (list prices): No. 20d to 60d, Wire, \$3.50; Cut, \$3.50; 10d to 16d, Wire, \$3.55; Cut, \$3.55; 8d, Wire, \$3.60; Cut, \$3.60; 6d and 7d, Wire, \$3.70; Cut, \$3.70; 4d and 5d, Wire, \$3.80; Cut, \$3.80; 3d, Wire, \$3.95; Cut, \$3.95; 2d, Wire, \$4.20; Cut, \$4.20. Special rates for carload lots.

GENERAL SUPPLIES.

POWDER.—F. o. b. San Francisco: No. 1, 70% nitro-glycerine, per lb., in carload lots, 15 1/2c; less than one ton, 17 1/2c. No. 1*, 60%, carload lots, 13 1/2c; less than one ton, 15 1/2c. No. 1** 50%, carload lots, 11 1/2c; less than one ton, 13 1/2c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2* 35%, carload lots, 9 1/2c; less than one ton, 11 1/2c. No. 2** 30%, carload lots, 9c; less than one ton, 11c. Black blasting powder

in carload lots, minimum car 728 kegs, \$1.50 per keg; less car lots, \$2 per keg. CAPS.—3x, \$5.50 per 1000; 4x, \$6.50; 5x, \$8; Lion, \$9, in lots not less than 1000. FUSE.—Triple tape, \$3.60 per 1000 feet; double tape, \$3.00; single tape, \$2.65; Hemp, \$2.10; Cement No. 2, \$3.00; Cement No. 1, \$2.65, in lots of 3000 feet and up.

CANDLES.—Granite 6s, 16 oz., 40s., 10c per set; 14 oz., 40s., 9c.

COAL.—San Francisco, coast, yard prices: Wellington, \$9; Seattle, \$6.50; Coos Bay, \$5.50; Southfield, \$8.00. Cargo lots, Eastern and foreign: Wallsend, \$7.50; Brymbo, \$7.50; Pennsylvania, hd., \$14.00; Scotch, \$8; Cumberland, \$12; Cannel, \$11; Welsh Anthracite, \$14.00; Rock Springs, \$9.00, long ton; Colorado Anthracite, \$14.00. Coke, \$14 per ton in bulk, \$16 in sacks; Sunnyside, \$11.50, long ton.

CHEMICALS.—Cyanide of potassium, 98%—99%, jobbing, 27@28c per lb.; carloads, 26@26c; in 10-lb. tins, 38c; sulphuric acid, in carboys, 68% B, 3c per lb.; soda ash, \$2.00 per 100 lbs.; hyposulphite of soda, 24@30c per lb.; blue vitriol, 54@61c per lb.; borax, concentrated, 7@8c per lb.; chloride of potash, 12@13c; rock sulphur, 5c; alum, \$2.00@2.25; flour sulphur, French, 2 1/2@2 1/2c; California refined, 1 1/2@2c; nitric acid, in carboys, 8c per lb.; caustic soda, in drums, 3@4c per lb.; Cal. s. soda, bbls., \$1.25 @1.50 per 100 lbs.; sds., \$1.05; chloride of lime, spot, \$2.50@2.60; nitrate of potash, in bbls, 8c; caustic potash, 10c in 40-lb. tins.

OILS.—Linseed, bbl., 73c; cs., 78c; raw, bbl., 71c; cs., 76c; lots of 5 bbls., 1c less; Lucol oil, bbl., 64c; cs., 70c; raw, bbl., 62c; cs., 67c. Kerosene—Pearl, per gal., 20c; Astral, 20c; Star, 20c; Extra Star, 24c; Eucene, 25c; Elaine, 22c; Water White, in bulk, 13 1/2c; Mineral Seal, iron bbls, 19c; wooden bbls, 22c; cs, 25c; Mineral Sperm, cs, 26c; Deodorized Stove Gasoline, bulk, 16c; do., cs., 21c; 86° Gasoline, bulk, 20c; do., cs., 26 1/2c; 63° Naphtha or Benzine, deodorized, in bulk, per gal., 14 1/2c; do., in cs., 21c; Lard Oil, No. 1 bbl., 60c; cs., 65c; Neats-foot Oil, bbl., 70c; cs., 75c; No. 1 bbl., 52 1/2@55c; cs., 57 1/2@60c; Sperm, crude, 60c; Natural White, 65c; Bleached do, 70c; Whale Oil, cs, 55c.

WHITE LEAD.—Per lb., in kegs: Five tons and over at one purchase, per lb., 6 1/2c; 1 ton and less than 5 tons, per lb., 6 1/2c; 500 lbs. and less than 1 ton, per lb., 7c; less than 500 lbs., per lb., 7 1/2c; in 25-lb. tin pails, 4c per lb. above keg price; in 1 and 5 lb. tin cans, 100 lbs. per case, 2 1/2c per lb. above keg price. Dry Lead.—In bbls., 1 ton and over, 6c; do. in kegs, 6 1/2c.

RED LEAD AND LITHARGE.—One ton and over at one purchase, per lb., 7c; 500 lbs. and less than 1 ton, per lb., 7 1/2c; less than 500 lbs., 7 1/2c.

ASSAY LITHARGE.—Per lb., 8 1/2c.

BISMUTH.—Subnitrate, per lb., \$1.60.

BONE ASH.—4c per lb.

BORAX.—Crystal, 7c; calcined, 25c.

CHROMIUM.—(90% and over) per lb., \$1.25.

COPPER.—Carbonate, 20c; Red oxide, 30c, 60c.

MAGNESIUM.—Per lb., \$3.00.

MANGANESE.—(90% and over) per lb., \$1.25.

MERCURY.—Bichloride, per lb., 90c.

MOLYBDENUM.—25c per gramme; 1000 grammes—2 1/2 lbs.

PHOSPHORUS.—(American) per lb., 80c.

SILVER.—Chloride, per oz., 75c; nitrate, 55c.

SODIUM.—Metal, per lb., \$1.00.

URANIUM.—Oxide, per lb., \$3.50.

ZINC.—Metallic, chemically pure, per lb., 50c.

ZINC.—Dust, per lb., 10c.

ZINC.—Sulphate, per lb., .04c.

(These prices are wholesale, f. o. b. San Francisco, unless otherwise noted.)

Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

HORSE HOLDING DEVICE.—No. 704,661. July 9, 1902. M. Lopicich, Sacramento, Cal. This invention relates to a device which is designed to hold horses and prevent running and similar accidents. It consists of a shaft revolvably and movably supported parallel with the rear axle of a vehicle, having gears adapted to engage with similar gears upon the wheel hubs, springs by which said gears are normally held in mesh, and a lever mechanism by which the gears may be disengaged to throw the apparatus out of use. Straps or cords are wound upon this shaft extending forward beneath the bottom of the vehicle, and one set of said straps is detachably connected with others which pass through guides upon the tugs or traces and returning thence are connected with the breeching of the harness, while the other set is in like manner detachably connected with the driving reins.

METHOD OF BUILDING DAMS.—No. 704,181. July 8, 1902. A. D. Foote, Grass Valley, Cal. This invention relates to a method of building dams of rock, gravel, sand, and finer material. It consists in the separation of a mass of material into larger rock or cobbles, smaller gravel, sand, earth, and silt and in depositing them successively so as to form, first, the front, then a layer of

finer material, then a deposit of silt or fine material upon the inner back surface of the dam, whereby it is made tight and strong and with a minimum amount of labor.

CAN BONY FORMING MACHINE.—No. 704,173. July 8, 1902. W. S. Case, Haywards, Cal., one-half assigned to J. H. Hunt, Oakland, Cal. This invention consists in the combination in one body forming machine of an endless traveling carrier, composed of flexibly connected tables adapted to receive and advance the blanks, jaws binged beneath the upper surface of said tables, mechanism by which said jaws are closed and a blank folded during the forward movement of the carrier. A horn is located above the carrier, having a groove in its top, about which horn the jaws fold the blank, with one edge in advance of the other and overlapping the groove. A wheel is journaled above the horn so that its periphery acts to bend the overlapping edges of the blank into the groove, and there is a pressure plate or bar, beneath which the partially undressed edge passes after leaving the roller, and a roller journaled above the terminal end of the groove whereby the interlocked seams is compressed and finished.

INSULATORS.—No. 704,172. July 8, 1902. J. E. Calvin, Camptonville, Cal., one-half assigned to E. C. Cochran, same place. The object of this invention is to provide a simple device whereby the conductor of an insulator may be quickly engaged or released without the use of the customary tie wires. It consists of a base, a cylindrical screw-threaded stem thereon, an annular shoulder on said base, said stem having a slot adapted to receive a conductor, and said shoulder having grooves coincident with said slot, so that the conductor is maintained and supported in an essentially straight line. A screw cap fits over said stem and has corrugations on its edge in which the conductor is adapted to seat and prevent the cap from unscrewing.

SITUATIONS WANTED.

An Electrical Engineer would like a position on some power plant in Arizona, New Mexico or Mexico. Thoroughly practical; twenty years' experience: sober. Experienced in telephone, telegraph, electric light, railway and power work. Repairs at mines. Good letters. Give particulars. Box 713, Riverside, Cal.

Practical and technical mine superintendent ten years' experience in Pacific Coast mines. Assayer, millman and construction engineer. Local references. Address "Mineral," care this office.

WANTED.—Position as Assayer and Bookkeeper in a mine; experienced in underground work; good references; present position not desirable. Address Box No. 127, care of this office.

WANTED.—Position by a technical graduate. Am an experienced stamp and cyanide millman, good assayer and chemist. U. S. deputy mineral surveyor. Can handle any kind of a mill or mine. Address Technical, care of this office.

ASSAYER. familiar with cyanide practice, desires position as assayer, or in some capacity, in cyanide plant. Address X, care of Mining and Scientific Press.

PRACTICAL MILLMAN—AMALGAMATOR. Cyanide Man and Assayer, wishes position. School of Mines graduate. Best references. Address R. B., care of Mining and Scientific Press.

Cyanide and Stamp Mill Superintendent open for engagement after September 1st. Graduate. A thorough assayer and chemist; also accountant. Speaks Spanish. Will go anywhere. Specialty, construction; also successful treatment of low-grade and slimy ores. References "A. I." Address Practical, care of Mining and Scientific Press.

A technically educated Mining Engineer, at present employed as superintendent of mines for one of the largest corporations in Mexico, desires a change of position to the United States about July 1st. Has had 18 years' successful experience as engineer and superintendent, never having made a failure; 36 years of age; strictly temperate; a skilled designer, geologist and metallurgist, and a practical miner, as well as a hard worker and thorough business man. References of the highest order, including present employers. Address Supt., care this office.

WANTED.

EXPERIENCED METALLURGICAL ENGINEER would furnish and erect mill or reduction works on developed, payable gold or copper mine. Must be first-class proposition. Replies will please state full particulars. None but principals negotiated with. Address "Reduction," this office.

WANTED.—A party thoroughly posted in mining who can sell mining stock in a reliable company developing its property in Idaho. References required. Address Hoosier Mining Company, Marion, Indiana.

WANTED.—BY TWO ENERGETIC AND EXPERIENCED mining men the acquaintance of persons interested in the development of mining property in old Mexico. Address D. L. C., care of this office.

Wanted to Bond a Dry Placer Claim, One Rich in Flour Gold.

Must be a dry proposition. Address "Placer Claim," care this office.

WANTED.

Consulting Mining Engineer, familiar with making examinations of mines, prospects and mineral lands. Address stating experience and references. Moderate salary to start, with advancement to competent man. Position permanent if found satisfactory. Address A., care of Mining and Scientific Press.

THE large advertisement inspires confidence because it indicates the advertiser's faith in the fact that he has something worth advertising largely.

FOR SALE.

CALIFORNIA RICH GRAVEL GOLD MINE.

Equipped with buildings, tools, etc.
Lower tunnel now running. No prospect.
Small amount of treasury stock for sale to complete the same.

Best of reports by leading experts.
Land patented. No encumbrance.
This is a snap. Write for prospectus.

E. S. ARMSTRONG,
Room 313 Chamber of Commerce Bldg., Chicago.

Gold Mining Properties
For Sale.

Two First-Class Placer Mines,
one having 20 years' record as a producer. Both in
good working condition. Terms reasonable.
Address "Enquire," care this office.

The Mines Exchange, Ltd.

Mines and prospects in British Columbia, the
Western States, and Mexico, for sale.
Free milling gold properties a specialty.
Write us for reports and information.
Bank references given.

Address THE MINES EXCHANGE, LTD.,
P. O. Box 700, Nelson, B. C.
Branch Office: P. O. Box 594, Salmon City, Idaho.

LUCIAN W. KNIGHT. C. DUDLEY DEAN.
DEAN & KNIGHT,
Purchasing Agency for Mines
and Mills,

218 HAYWARD BLDG., SAN FRANCISCO.
Reference: Anglo-Californian Bank, Ltd.

EXAMINATION OR SUPERVISION
of Mines, Smelters and Mills.

Mining Engineer and Metallurgist, of unquestionable
reputation and long experience, now permanently
residing at Seattle, Wash., will examine or
take general supervision of mines, smelters or
mills, in Pacific Coast States, British Columbia or
Alaska, as consulting engineer, for reliable parties.
Is also reliable accountant to examine.
Box 813, Seattle.

MINERS' AND PROSPECTORS' GUIDE.
REVISED THIRD EDITION.

By James Irving & Co., Gold Refiners and Assayers,
128 N. Main St., Los Angeles, Cal.

Contains U. S. State and Territorial Mining
Laws, as well as much useful information for
miners and millmen.

Price 25 Cents.

Quicksilver

BY THE FLASK OR CARLOAD.
WEIGHT AND QUALITY GUARANTEED.

The Eureka Company,
OF SAN FRANCISCO.

320 Sansome Street, - SAN FRANCISCO.

Quicksilver

IN LOTS TO SUIT.
Write for Quotations.

REDINGTON & CO., 23-25-27 Second Street.
SAN FRANCISCO, CAL.

THE CALIFORNIA DEBRIS COMMISSION
having received applications to mine by the hydraulic
process from Fred G. Low Jr., in the Lone
Star Mine at Cromberg, Plumas County, Cal., to
deposit tailings in Jackson Ravine, draining into
Jackson Creek; from B. H. Wemple and A. M.
Davis, in the Clippershire Mine, near St. Louis,
Sierra County, Cal., to deposit tailings in Cedar
Grove Ravine, draining into Slate Creek; from
Catacart Gold Mining & Power Co., in the Indian
Bar Placer Mine, near Spanish Ranch, Plumas
County, Cal., to deposit tailings in basin draining
into North Fork of Feather River and from Geo.
W. Cox, in the Dorothy Mine, at Howland Flat,
Sierra County, to deposit tailings in Slate Creek.
gives notice that a meeting will be held in room 96
Flood Building, San Francisco, Cal., on August 4,
1902, at 1:30 P. M.

DELINQUENT SALE NOTICE.

REWARD GOLD MINING COMPANY.—Location of principal
place of business, San Francisco, California; location of works,
Pine Grove, Amador County, California.

Notice.—There are delinquent upon the following
described stock, on account of assessment (No. 10)
levied on the 28th day of May, 1902, the several
amounts set opposite the names of the respective
shareholders, as follows:

Names.	No.	No.	
		Ord.	Shares. Amt.
Fraser, J. P.	147	1,000	\$20 00
Hyde, Jas. L.	105	500	10 00
Stadfield, J. J., Trustee	91	500	10 00
Stadfield, J. J., Trustee	92	500	10 00
Stadfield, J. J., Trustee	93	500	10 00
Stadfield, J. J., Trustee	94	500	10 00
Stadfield, J. J., Trustee	95	500	10 00
Stadfield, J. J., Trustee	96	440	8 80
Stadfield, J. J., Trustee	141	300	6 00
Stadfield, J. J., Trustee	142	200	4 00
Stadfield, J. J., Trustee	253	1,000	20 00
Stadfield, J. J., Trustee	254	1,000	20 00
Winterberg, W.	154	5,000	100 00

And in accordance with law, and an order from the
Board of Directors, made on the 28th day of
May, 1902, so many shares of each parcel of such
stock as may be necessary, will be sold at public auction,
at the office of the company, Room 56, No. 309
Montgomery street, San Francisco, California, on
MONDAY, the 21st day of July, 1902, at the hour
of 11 o'clock A. M. of said day, to pay said delinquent
assessment thereon, together with costs of
advertising and expenses of sale.

J. STADFIELD, JR., Secretary.

Office—Room 56, No. 309 Montgomery street, San
Francisco, California

ASSESSMENT NOTICES.

LARKIN MINING COMPANY.—Location of principal
place of business, San Francisco, California; location of works,
El Dorado County, California.

Notice is hereby given, that at a meeting of the
Board of Directors, held on the 13th day of
June, 1902, an assessment (No. 13) of two (2) cents
per share was levied upon the capital stock of the
corporation, payable immediately in United States
gold coin to the secretary, at the office of the company,
112 Main street, San Francisco, California.

Any stock upon which this assessment shall remain
unpaid on the 19th day of July, 1902, will be
delinquent, and advertised for sale at public
auction; and unless payment is made before, will
be sold on MONDAY, the 11th day of August,
1902, to pay the delinquent assessment, together
with the costs of advertising and expenses of sale.
By order of the Board of Directors.

N. F. REMINGTON, Secretary.

Office—112 Main street, San Francisco, California

MAYDAY GOLD AND SILVER MINING COMPANY.—Location of principal place of business, San
Francisco, California; location of works, Calaveras
County, California.

Notice is hereby given that, at a meeting of the
Board of Directors, held on the 10th day of July,
1902, an assessment (No. 6) of three cents per share
was levied upon the capital stock of the corporation,
payable immediately in United States gold
coin to the secretary, Edward H. Stearns, at his
office, Room 405 of the Claus Spreckle Building,
Cor. Third and Market Sts., San Francisco, California.

Any stock upon which this assessment shall remain
unpaid on the 19th day of August, 1902, will be
delinquent, and advertised for sale at public
auction; and unless payment is made before, will be
sold on TUESDAY, the 19th day of September, 1902,
to pay the delinquent assessment, together with the
costs of advertising and expenses of sale.
By order of the Board of Directors.

EDWARD H. STEARNS, Secretary.

Office of the Company—Head's Business College,
24 Post St., San Francisco, California.

MARINA MARSICANO GOLD MINING COMPANY.—Location of principal place of business,
San Francisco, California; location of works, Sunny
Hill, Shasta County, California.

Notice is hereby given, that at a meeting of the
Board of Directors, held on the 16th day of July,
1902, an assessment (No. 30) of five (5) cents per
share was levied upon the capital stock of the corporation,
payable immediately in United States
gold coin to the secretary, at the office of the company,
415 Front street, San Francisco, California.

Any stock upon which this assessment shall remain
unpaid on the 19th day of August, 1902, will be
delinquent, and advertised for sale at public
auction; and unless payment is made before, will be
sold on MONDAY, the 8th day of September,
1902, to pay the delinquent assessment, together
with the costs of advertising and expenses of sale.
By order of the Board of Directors.

CHAS. BOVONE, Secretary.

Office—415 Front street, San Francisco, California

WILLIETTA MINING AND MILLING COMPANY.—Location of principal place of business, San
Francisco, California; location of works, near
Jacksonville, Tuolumne County, California.

Notice is hereby given, that at a meeting of the
Board of Directors, held on the 20th day of June,
1902, an assessment (No. 4) of one (1) cent per
share was levied upon the capital stock of the corporation,
payable immediately in United States
gold coin to the secretary, at the office of the company,
Room 233 Crocker Building, corner of Post
and Market streets, San Francisco, California.

Any stock upon which this assessment shall remain
unpaid on Monday, the 4th day of August, 1902,
will be delinquent and advertised for sale at public
auction; and unless payment is made before, will be
sold on TUESDAY, the 2d day of September, 1902, to
pay the delinquent assessment, together with the
costs of advertising and expenses of sale.

By order of the Board of Directors.

B. McALLISTER, Secretary.

Office—Room 233 Crocker Building, corner of Post
and Market streets, San Francisco, California.

Montana State School of Mines.

The State School of Mines, located at Butte,
Montana, in the midst of the greatest mining
camp in the world, offers unrivalled opportunities
for practical work and observation. Its third year
will open September 9th. Examinations for admission
or advanced standing, September 8th.
For catalogue or other information, address

N. R. LEONARD, President.

MICHIGAN
COLLEGE OF MINES.

An Engineering School with unique location, giving
unusual facilities. New Mining Engineering
and Hydraulic Building, also Chemical and Metallurgical
Building ready for fall term 1902. For catalogue
giving list of graduates and their occupations,
address

F. W. McNAIR, Pres't, Houghton, Mich.

CHICAGO

IN LESS THAN

3 DAYS

From
San Francisco at 10 a. m.

CHICAGO, UNION PACIFIC
& NORTHWESTERN LINE.

Pullman fourteen-section Drawing-Room and
Private Compartment Observation Sleeping
Cars, with Telephone Electric-reading Lamps
in every Berth, Compartment and Drawing
Room. Buffet, Smoking and Library Cars, with
Barber and Bath Dining Cars—meals a la
carte. Electric-lighted throughout.
Daily Tourist Car Service at 6 P. M. and Per
sonally Conducted Excursions every Wednesday
and Friday at 8 A. M. from San Francisco
The best of everything.

R. R. RITCHIE,

617 MARKET ST. Gen. Agent Pacific Coast,
Palace Hotel. San Francisco.

Florence and
Cripple Creek

RAILROAD

And Associated Companies.

The Connecting Link between the Gold
Mines of the Cripple Creek District
and the mills and smelters
in the valley below.

40=Miles=40

Of the grandest mountain scenery on
earth. Connecting at Canon City
and Florence with all Denver
& Rio Grande Railroad
trains from east and west.

For rates, routes and literature descriptive
of the Cripple Creek District,
call on or address

L. R. FORD,
Vice-Pres. and Traffic Manager,
DENVER, COLO.

THE COLORADO MIDLAND RAILWAY

Reaches the Grandest Scenery in the World:

Ute Pass, Hagerman Pass, Hell Gate, Pike's
Peak, Mount Sopris, Mount of the Holy Cross.

The Most Beautiful Summer Resorts in Colorado:

Manitou, Cascade Canyon, Green Mountain
Falls, Woodland Park, Glenwood Springs.

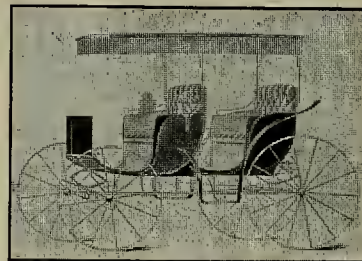
The Most Famous Mining Camps:

Cripple Creek, Victor, Leadville, Aspen,
C. H. SPEERS, Asst. Gen. Pass. Agt., Denver, Colo.

HENRY CAREY BAIRD & CO.,
INDUSTRIAL PUBLISHERS, BOOKSELLERS & IMPORTERS
810 Walnut St., Philadelphia, Pa., U. S. A.

Our New and Revised Catalogue of Practical and
Scientific Books, 32 pages, 800; a Catalogue of Books on
Metallurgy, Mining, Prospecting, Mineralogy, Geology,
Assaying, Analysis, etc.; a Catalogue of Books on Steam
and the Steam Engine, Machinery, etc.; a Catalogue of
Books on Sanitary Science, Gas Fitting, Plumbing, etc.,
and our other Catalogues and Circulars, the whole covering
every branch of Science applied to the Art, sent free and
free of postage to any one in any part of the world who
will furnish his address.

Consolidation CLEARANCE SALE.



The San Francisco House of the

COLUMBUS BUGGY CO.,

1321-1325 MARKET ST., SAN FRANCISCO.
Having a big clearance sale of all kinds of vehicles
preparatory to incorporating July 1, 1902.

COLUMBUS BUGGY CO.'S VEHICLES,
HENNEY BUGGY CO.'S VEHICLES,
MITCHELL FARM WAGONS.

An Opportunity to Save Money.

Save Yourself of It.

We have a surplus of "Mount In Buggies," wide
track, same as regular stage buggies on wide springs
with quizzing bars as well as a lot upon regular
end springs with supplemental springs to hold brake
from rocking body forward. These were made by
Henney Buggy Co. The price formerly was \$125.00
with pole and brake—now only \$85.00 net. Be quick!

The Most Productive
Mining Districts

In Colorado are best reached via the
COLORADO AND SOUTHERN
RAILWAY.

whose lines also reach all the principal financial
and commercial centers of the State. There is

LOTS OF GOLD
still left in the mountains of this wonderful State
only awaiting the prospector's pick.

Write for Illustrated and Descriptive Literature.

T. E. FISHER, GEN. PASS. AGT.,
DENVER, COLO.

POOR ADVERTISING is an "ex-
pense." Good advertising is a pay-
ing investment.



OIL & WATER TANKS

OF ANY CAPACITY

BOILERS, STACKS,

PLATE & SHEET IRON WORK

THE RISDON IRON & LOCOMOTIVE WORKS

MAIN OFFICE & BRANCH WORKS,
STEWART & FOLSOM STREETS,
SAN FRANCISCO CALIFORNIA

MAIN WORKS,
POTRERO,
SAN FRANCISCO

MANGANESE STEEL

CUTTING LIPS

for Steam Shovels
and DREDGES.

THOMAS PATENT COMPOUND DIPPER TEETH

with points of Manganese Steel
readily replaced when worn out.



MANGANESE STEEL CASTINGS

for use where there is much wear due to gritty material handled.
Repair parts for GOLD DREDGES.

TAYLOR IRON & STEEL CO.,
HIGH BRIDGE, N. J.

Sole Licensees in America under the HADFIELD System and Patents

Pacific Coast Parties Interested Please Address HARRON, RICKARD & McCONE, San Francisco, Cal.

MINING AND SCIENTIFIC PRESS

Whole No. 2192.—VOLUME LXXXV.
Number 4.

SAN FRANCISCO, CAL., SATURDAY, JULY 26, 1902.

THREE DOLLARS PER ANNUM.
Single Copies, Ten Cents.

Coking Plant at Tercio, Colo.

We are indebted to F. M. Drescher, E. M., Denver, Colo., for the following description of the coking plant being erected by the Colorado Fuel & Iron Co. of Denver, Colo., at Tercio, Colo.:

The formation is Larimie Cretaceous which has been tilted to an angle of about 45° and contains innumerable veins and seams of coal. The veins vary in thickness from 3 to 8 feet. The strike of the veins varies from north 35° west to north 45° west. The coal is mined through tunnels and overhead stopes, being loaded into cars from chutes as is customary in metal mining. There are at present six openings being worked, the same system of development being pursued in all openings. The coal is transferred to the mouth of the tunnel by mule power and thence to the tipples by small jacket boiler locomotive.

From No. 2 north mine the coal is dropped on an incline plane or gravity tram, the loads pulling the empties up, and transferring from sixteen to twenty tons to a trip. This incline is 1400 feet long and the base is within 900 feet of the north tippie. The coal is automatically dumped at the tippie, the lump coal being separated preparatory to shipping, and the fine coal and slack being transferred by flights into the storage bin. This bin is 220 feet long by 24 feet wide. From the bin the coal is elevated to the top of the washery. This washery is a coal concentrator. The coal is crushed and sized, all particles of pyrities and waste being separated out.

From the washery the coal goes to the Larry bin or washed coal bin, whence it is loaded into cars and transferred to the upper ends of the ovens and drops by gravity to the required point in charging. The ovens are built in batteries of 300 each, 150 on a side, the total length of each battery being 2400 feet. From top of rail to top of ovens is about 21 feet and each battery is 31 feet wide. One battery is nearly completed, another in process of construction, and two more are projected. These batteries are built to suit the lay of the country.

The ovens are built on a 2% grade to facilitate the charging. The beehive type of ovens is employed, each oven burning about seven tons of coal per twenty-four hours. There is a 12-foot wharf along the face of the ovens which is 10 feet above the top of rail. The coke after being removed from the ovens is loaded directly into the cars from the wharf. The ovens are built of firebrick on a foundation of white sandstone, which is quarried on the ground.

The water supply is taken from a reservoir which is supplied from the Purgatoire creek by a 16-inch wooden stave pipe line. The reservoir is 100 feet square, 10 feet deep, having sides slope one to one. There is 6 inches of concrete on sides and bottom with a 1-inch coating of cement. This reservoir supplies water for the ovens, washery and the town.

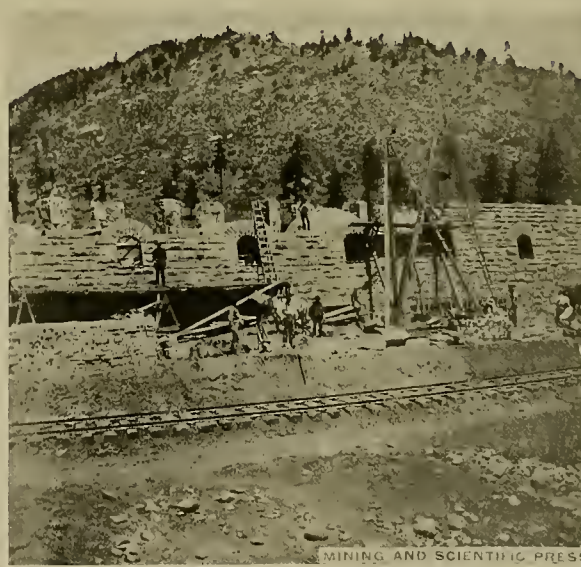
That is an unlikely story from Tuolumne county, Cal., that the deepest mine in that county is to be closed down because its depth involves too costly machinery for the ore to pay. The mine in question—the Dead Horse—is only 1700 feet in its deepest workings, and the ore is of the same general nature as that in other properties along that main lode that are being profitably worked to a depth of from 1800 to 2500 feet. Doubtless the real reason has not transpired, but with present hoisting appliances and



Washery from South Tippie—Coking Plant, Tercio, Colorado.



End View of Ovens—Coking Plant, Tercio, Colorado.



Detail of Oven Construction—Coking Plant, Tercio, Colorado.

COKING PLANT OF COLORADO FUEL & IRON CO. AT TERCIO, COLORADO.

economical management it should and would cost less to hoist from 2000 feet than it did to hoist from 200 feet when that particular mine was first opened up.

THE successful transmission with commercial profit of 60,000 volts 150 miles, as narrated in the issues of June 21 and 28, reminds an old electrical engineer of the fearful forebodings indulged in by some electricians but a few years ago in pronouncing as absolutely impossible the proposed transmission of 20,000 volts 40 miles. It illustrates that in electrical progress, as in other branches of engineering, that which is impossible is merely some stage of advance that at that particular moment had not been made possible.

Force of Explosives.

Last week's disastrous explosion of dynamite on the 1200-foot level of the Daly-West mine, Park City, Utah, by which thirty-five unfortunate miners lost their lives, presents the usual features of stupendous force manifested, horses having been killed at the mouth of a tunnel two miles from the spot where the explosion occurred.

The matter has already been treated in these columns, but a few remarks on explosives in general are in order.

An explosive is a body which contains within itself the elements necessary to produce, by new combinations, a large amount of heat, and at the same time changes from a solid or liquid to a gaseous state, unless, as is sometimes the case, the explosive is itself gaseous, when the force of explosion is due entirely to the evolution of heat and the consequent expansion due to it.

The most powerful explosives are those possessing the greatest specific gravity or the greatest weight within the smallest volume, compared with the volume of heated gases evolved when exploded. One frequently hears of some one having invented a new and wonderful high explosive, many times more powerful than the strongest dynamite, but upon investigation, it is learned that the substance is, after all, no more powerful or wonderful than has long been known to science. The force of an explosive is limited, because, as stated, its power depends entirely upon the relative value of its gaseous products when expanded under the heat produced by the reaction of decomposition compared with the

original volume of the explosive before detonation.

Among the most powerful explosives known are nitro-glycerine, nitro-gelatine, No. 1 dynamite, and picric acid and its compounds. These have a specific gravity ranging from 1.6 to 1.7, and it is estimated that upon detonation they are capable of setting free a sufficient volume of gases and at a sufficiently high temperature to produce, under atmospheric pressure, something like 10,000

to 15,000 times the original volume of the material. This represents a pressure of from 250,000 to 350,000 pounds to the square inch. Detonation means the conversion of the body into gases by a wave action, and the speed of this wave of detonation has been determined to be about 20,000 feet per second. That is, if one should take a big iron sewer pipe about 4 miles long, and fill it with No. 1 dynamite, and detonate it at one end with a powerful exploder, it would take about one second for the explosive wave to travel the entire length of the column of high explosive, the explosive wave traveling at the rate of about 4 miles per second. This illustrates how in the Daly-West disaster horses were killed, 2 miles from the scene of the disaster, the explosive wave requiring about one-half second to traverse that distance.

MINING AND SCIENTIFIC PRESS.

ESTABLISHED 1860.

Published Every Saturday at 330 Market St., San Francisco, Cal.
TELEPHONE, DAVIS 771.

ANNUAL SUBSCRIPTION:

United States, Mexico and Canada.....\$3 00
All Other Countries in the Postal Union..... 5 00

Entered at the San Francisco Postoffice as second-class mail matter.

Chicago Office (Telephone, Harrison 73).....737 Monadnock Block.
Denver Office (Telephone, Olive 733).....606 Mack Block.

J. F. HALLORAN.....Publisher.

San Francisco, July 26, 1902.

TABLE OF CONTENTS.

ILLUSTRATIONS.—Washery from South Tiptple—Coking Plant, Terco, Colo.; End View of Owens—Coking Plant, Terco, Colo.; Detail of Oven Construction—Coking Plant, Terco, Colo.; 43. Leyner and Sullivan Machines Drilling Uppers; Owen Williams Operating Ingersoll Drill, 47. Oil Furnaces for Assaying and Melting, 49. This Paper's Wrapper; The Pump House and Workshop at Jackson, Amador Co., Cal., 50. Mining and Metallurgical Patents, 51.

EDITORIAL.—Force of Explosives; An Unlikely Story; A Successful Transmission of Voltage; Coking Plant at Terco, Colo., 43. Death of John W. Mackay; Taxation of Mining Interests; Revival of Gold Mining in Nevada; A Card Index; Will Break the Price of Coal; Impounding Mine Debris; Water Problem in the Leadville, Colo., District; Concentrating Mineral Values from Ores by Oil, 44.

MINING SUMMARY.—52-53-54.

LATEST MARKET REPORTS.—55.

MISCELLANEOUS.—Concentrates, 45. The Credit of Mining Engineering; Electro-Metallurgical Industries of Germany; Mining Asbestos in Canada, 46. Recent Rock Drilling Contest; Quicksilver, 47. Extraction of Gold by Chlorobromination; Lubrication of Gearing; Presence of Gold in Iron Pyrites, 48. Oil Furnaces for Assaying and Melting, 49. This Paper's Wrapper; Water from Miner's Ditch; A Multiplication-Addition Table; Treatment of Oxidized Ore; Hydraulic Mining Failures; Australia a Producer and Seller of Silver; A 50,000 Volt Transmission System; Compressed Air for Mine Haulage; The Deep Lake Mines; Want Bids on Aerial Tramway, 50. Mining and Metallurgical Patents; Volumetric Copper Determination; Some Australian Salaries, 51. Personal; Commercial Paragraphs; Recently Declared Mining Dividends; New Patents; Notices of Recent Patents; Obituary, 55.

THE passing of John W. Mackay is the occasion of universal eulogy, all of which is deserved. Seldom indeed has the death of any man elicited so general a tribute of praise as that bestowed on the memory of the miner who made millions without a shadow of dishonesty and who made the world better for having lived in it. Most men when they acquire, say a million, become spoiled; some swell up and forget their old associates; others become howelless beings with hut a hook and a claw. Mackay was the same when timbering on the Comstock for \$4 a day or after amassing \$30,000,000. The millions meant to him only opportunity, a chance to give rein to the generous impulses of his nature, and to step into wider ways of business. He was a good example of an American workingman, a living illustration of the opportunities for wealth that this country affords; his charities were not bounded by country nor creed, and he always to the last believed in good honest work. Ordinarily some perfunctory words of praise are said by those immediately concerned when a rich man dies, but with Mackay it is the man and not the money that thousands recall, and genuine respect is manifested for his life and character.

TAXATION of mining interests is always a complex problem. In general, it is well nigh impossible for an assessor to put a just value on several hundred mining claims. It is much easier to assess town lots, orchards, farms, buildings or live stock, but difficult to equitably value mining property developed or undeveloped. A property may not appear to be worth \$1000 to-day, and in ninety days may be actually worth \$1,000,000; or it may be apparently worth \$100,000 now and not be worth \$100 in six months. A mining property is a constant source of expense and nothing but expense till it becomes a producer. Then it usually becomes a profit to its owner, and to the community where it is. It furnishes employment and adds to general and permanent wealth. It is a creator of prosperity, hence the hand of the tax gatherer should ever be laid lightly upon it. No mining property should be taxed until the productive stage is reached, and then only on the net output. The miner is inevitably taxed in a variety of ways, and deserves a certain degree of fostering care from the State and Federal Government. To tax the mines to death means to destroy or greatly retard that region's mineral development and the frightening away of capital. Of course, a fair share of taxation should be placed on all mining property; but,

when carried further, it injures the mining industry and every other class of business dependent upon the miners.

FROM various parts of western Nevada in the last year have come reports of rich finds of gold ore and subsequent development has shown that in nearly every case the original report was not exaggerated. Nevada is second to none of her sister States in mineral wealth, but since the decline of the Comstock has not for twenty years been given the attention that it is now receiving. Ten years ago this paper pointed out that new Comstocks were awaiting development in that part of the State, saying that when men realized that the old glories of the Comstock could never be fully resuscitated, new bonanzas awaited development with far less expenditure and under newer and more favorable auspices. It would have sounded singular to say it then, but it is within the bounds of probability to assert that in five years the annual gold yield of Nevada may equal in amount that of any other State. Nevada was long known as "the silver State," but even in the days of her greatest hulsion yield, between 1870 and 1880, the average of the Comstock output was 46½% gold.

TO THOSE of our readers who do not keep a card index or who do not even keep a file of the paper the suggestion is made that even now, or at any time, it were well to begin. It is the commonest occurrence in this office to get a note: "Last year (or it may have been the year before) I saw an article in your paper on so and so. I have immediate use for the data and would take it as a favor if you would send me the copy." With anxiety to oblige and with every desire to accommodate any subscriber it is often impossible to supply what is wanted from such meager data, and an hour's research is oftentimes lost in fruitless endeavor to supply what is wanted. A copious index is bound in the twenty-sixth issue of each volume, and, ordinarily, the index affords the reader a clue to just what he may want to find. Better still is the card index. Some one has happily said that good habits are just as easy to form as bad habits, and just as hard to break. It is earnestly suggested that the "habit" of making a card index be formed. It will be found useful, and like other useful things will save all concerned considerable valuable time.

THE long-distance pipe line, now building through central California for the transmission of oil to the numerous industrial concerns clustered around San Francisco bay and projected water transportation, will further break the price of coal which at a high figure so long held down the mining, manufacturing and general industrial interests of California. The same conditions now obtain in Los Angeles and other points, and there is a general lowering of fuel bills throughout California. Fuel oil is now on the market at from 60 to 80 cents per barrel for the best qualities. Steam coal used to cost from \$8 to \$12 per ton; oil at 70 cents per barrel is about equal to steam coal at \$3 a ton, illustrating how oil for fuel excels in point of economy. Coal receipts at the port of San Francisco are constantly decreasing, but 621,888 tons having arrived during the six months ending June 30, 1902, there being a decrease of nearly 500,000 tons of coal so entering during the last two years and a corresponding increase in fuel oil consumption. Deep sea-going vessels, as well as railway locomotives, are successfully using oil, and arrangements are being made for oil shipments to the Orient. The stimulus to Pacific coast industries is becoming monthly more noticeable. Mining plants throughout California are beginning to use fuel oil, which, with electricity, will relieve mine operators from former heavy expense and expedite mine development accordingly.

OLD readers of this paper who were once young will remember an effort, finally successful, that secured \$600,000 State and Federal appropriation for impounding mine debris in the lower Sacramento valley, Cal. A great deal of space was devoted by this paper to the matter and considerable zealous effort was made to get the money. The money was secured, and has been available; untoward circumstances have kept things just as they were. This week the matter comes up again. The idea is now entertained that actual work may begin this year on the first of a series of proposed dams, on the Yuha

river, 16 miles east of Marysville, Cal. The plan is to store mining debris and control the low water channel of that stream. The whole scheme long since received official sanction. The matter was made the subject of special effort at the 1901 session of the Cal. State Miners' Association. Bids for the work will be opened at Washington, D. C., on the 12th prox., if the preliminary specifications be approved by the Secretary of War, though it is yet an open question as to whether the work will be done by contract or direct by the Cal. Debris Commission.

IN last week's issue the helief was briefly stated that the water problem in the Leadville, Colo., district could only be solved by pumping, the contour of the country precluding the probability of deep drainage being successful. In the case of the Cripple Creek, Colo., district conditions favor the solution of the water question by deep drainage, but such a drain tunnel must necessarily be a joint affair—a common enterprise prosecuted at the expense of the several properties to be benefited. Experience on the Comstock and elsewhere shows, however, that to secure such joint co-operation is very difficult. The obstacles appear insuperable. The Elkton is at present the one property most directly affected. In that mine the cost of pumping now cuts so deep into the profits as to make questionable from their lone point of view the policy of continuance. The management is about to put a new and more powerful pump on the ninth level in the effort to fight the water out, and deserves applause for the strenuous and long-continued work therein. The case in Cripple Creek is the same in kind but greater in degree with the situation in Clear Creek and Gilpin counties. The Newhouse tunnel at Idaho Springs, now 2½ miles long, if extended an equal distance would tend to solve the same water problem in Gilpin county that affects Lake and Teller counties. But the kingdom of Gilpin is not yet inclined to co-operate with Manager Newhouse to the extent of sharing in the heavy expense that such extension would entail. Of course, this whole drainage problem is a case of history repeating itself, for sooner or later those interested will realize the need of making common cause. Probably the ultimate outcome may be legislation similar to that in the case of the Sutro tunnel in Nevada, with the same result.

ROSSLAND, B. C., MINING MEN are inclined to think that the process of concentrating mineral values from the ores by the use of oil may mean as much for that district as the cyanide process does for South Africa, the Le Roi mine manager citing the fact that that mine's large low-grade ore bodies, with too much silica and too little copper for profitable smelting, can with assured success use the Elmore process of concentration—or, rather, separation. In the case of the Le Roi ores ordinary concentration methods are precluded, because of the brittle chalcocopyrite in the ore. The manager's figures show that the total cost of mining and getting the ore on cars is \$2.62 per ton. Of all mined, one-fifth was sorted out, the remainder having to pay all charges, including the sorting, the sorted material being of no value under present treatment. Mr. McKenzie figures that by using the oil process all the ore mined can be treated, bringing the cost of mining down to \$2 per ton, the cost of crushing and concentrating 50 cents per ton, the oil loss 15 cents per ton of ore treated. The tests, so far on a small scale, show a saving of 80%. Mr. McDonald, manager Le Roi No. 2, says on this subject: "Tests of the ores of this camp show that the Elmore process can concentrate what is now considered waste rock—that is, ore running one-half of 1% copper—twelve tons into one, making a product containing 6% copper, and eliminating at the same time a large percentage of the silica and aluminum, that now constitute the chief expense and difficulty in smelting these ores. The resulting product—that is, the concentrates—will require less than one-half of the fluxes and not more than one-half of the coke now required to smelt a ton of the crude ore. All the costs of concentration by this process should not exceed \$1 per ton, including freight to the works." Meanwhile Manager Severin Sorenson is to be the Rossland pioneer in any kind of concentration, he being about to put in a small concentrating plant at the Velvet mine, the whole thing being purely experimental in that region.

Concentrates.

QUICKSILVER is quoted at \$50.00 per flask in Denver, Colo.

A 1½ H. P. MOTOR would run ten or twelve 16-candle power incandescent lamps.

SO FAR as "Concentrates" knows, the altitude has no appreciable effect on the result of an assay.

BLUE PRINTING by electric light is feasible, and often found in actual practice to be as satisfactory as by sunlight.

INCREASING railroad speed from 30 to 60 miles per hour doubles fuel consumption and increases water consumption 50%.

ACETYLENE GAS can be used in a gas motor, but there is no object in such use; it costs more and requires more care and precaution.

MOST certainly two years' assessment work can be done at one time—beginning the assessment for the current year in December, working right along and in the following January doing the assessment work for that year.

A DYNAMO for igniting a charge in a gas engine is usually a small machine built for this special work. It is not adapted for lighting purposes. Current from a lighting plant could be used to ignite the gas for a gas engine.

THE theoretical is but a study of the practical; the practical man is often of little use at theory except in so far as he builds under competent supervision the parts which the carefully evolved theories of his more studious confreres have made possible.

SOUTH AMERICAN ores are mostly treated in Europe, though a small portion goes to Pueblo, Colorado, via San Diego, Cal., and a still smaller portion comes to San Francisco. There is an increasing amount of ore treatment at Autofogasta, Chili, and other points on the west coast.

WHERE a sheet of water is falling vertically down the face of a dam, practically no vacuum could exist between the sheet and the dam, as there would be nothing to resist the external pressure on the water sheet, and at the very instant that the water began to form external air pressure would force the sheet of water back against the dam.

IN the case of *Ober vs. Schenck*, 65 Pac. Rep., 1073, the Supreme Court of Utah decided that, where a mining lease provided that it should terminate on "a sale or transfer" of the property, the word "transfer," as there used, related to a transfer of the title to the property, and not to a mere transfer of the right of possession of same.

ONE 42-gallon barrel of oil, specific gravity .920, will weigh 325 pounds. Three such barrels of oil will produce as much steam as one ton of anthracite coal. One pound of oil, gravity .920, free from water, sand and clay, will evaporate as much water in a steam boiler as two pounds of anthracite coal, two and a quarter pounds of ordinary bituminous coal, or three and a half pounds of lignite coal.

MAGNET WIRE is ordinary copper wire covered with one or two layers of cotton thread so that the wire of one turn or layer shall not touch the wire of the adjacent turns or layers. Magnet wire is just insulated wire; common wire is uninsulated. Insulated wire is used so that the electricity must go through the whole length of the coil round and round, and not pass across to the other end of the coil directly.

IN setting telegraph and telephone poles the earth should be removed a few inches from the poles and at a depth of 2 or 3 inches, and this hole should then be filled with tar oil, so that the pole is tarred just above and below the ground. After this is done the earth should be placed back. In some localities companies using large, round poles dig narrow channels from 2 to 3 feet deep around the poles and fill the channels with rock salt for surface preservation.

A BOILER explodes because it is not strong enough to stand the pressure that is put upon it, and that covers the whole ground. The boiler may be new, with defects that render it at once unsafe, and when working pressure is put upon it there is trouble, or it may be old and gradually grow weaker until it fails under an ordinary pressure. Of course, it takes an experienced engineer to tell when it has become unsafe, but there is nothing supernatural about it.

TO USE one of those divining rods or magnetic indicators in the search for gold or silver, it is easier and just as effective to get a good map of the region, and pass the divining rod or indicator over its surface. Thus instead of wearily traversing what may be a rough country the devout believer can save considerable exertion by the use of a map in the manner indicated. It is much easier, and the result, so far as tangible results are concerned, is the same in either case.

TO TEMPER and harden a tap, bring the completed tap to a blood red, even heat. Dissolve a handful of salt in a bucket of clean water, set the water to whirling by stirring in it a stick and thrust the heated tap vertically into the vortex of the whirlpool. The tap is to be drawn to a straw color. Heat a piece of cast-iron tube to a dull red heat. The tap is then to be held in the center of the tube and carefully turned until the proper

color is produced. Quenching will fix the color and finish the tap.

THE Parke-Whittaker cyanide process is designed mainly for the extraction of gold and silver from cupriferous ores or concentrates. After the ore has been given a chloridizing roasting the soluble copper chlorides are leached out by water, and after the subsequent application of an alkaline wash a dilute solution of cyanide is used to extract the gold and silver.

WHERE two mining locations adjoin, and have one common side line, and where the croppings of a vein, apexing upon the senior of these two locations, and dipping towards the junior, crosses this side line to the surface of the junior location, the vein does not become the property of the latter until the whole of it (both foot as well as hanging wall) passes into the territory of the junior. Nor does the latter acquire any underground or extralateral rights under said croppings until all of them and both the enclosing walls are in their territory.

IN modern chain making the chain cables are rolled direct from steel bars. The bars are heated in a furnace 70 feet long, and are drawn direct into the rolls. In the course of its passage a bar of this length, weighing two tons, is quickly converted into a red-hot 1½-inch cable, 90 feet long, link within link, without weld. The links are connected by webs and fins, which are afterwards removed cold by punching and special planing machines. It is stated that a cable made in this manner from the usual ship quality of steel is 50% stronger than the best welded iron cable of the same size, and that it is very tough.

A PLACER LOCATION covering 160 acres is considered as one claim by the Land Department since July 1, 1898, and \$4000 worth of work is necessary; but all may be patented under one application, if adjoining each other. It were well to note in revised U. S. statutes as to all that is necessary under rule 53. The eight locations are assumed to be united in each 160-acre lot. If they are in thirty-two 20-acre locations \$500 worth of work will have to be done upon each claim to entitle the applicant for patent. It would require a separate application for each lot or location if the same are separate or cannot be joined either before or after that date.

IT IS POOR PRACTICE to use a file in attempt to dress the commutator of a dynamo or motor. Sandpaper is much better, and even with the latter a little oil on the sandpaper is in order as a preventive of particles of copper flying into the armature, increasing the danger of short circuits or burning out. Copper dust and metal filings in general should not be allowed to collect about a dynamo or motor. Emery cloth should never be used on a commutator, for the particles of emery are so sharp they become lodged in the copper of the segments, making a grinding tool of the commutator. Then, too, the particles get into the mica and occasion short circuits. A motor with short-circuited coils or bad grounds will draw excessive current, even though running free of load.

INFUSORIAL EARTH, sometimes known as fossil meal, diatomaceous earth, and by other names, has of late years found numerous applications in the arts. Its principal use is in the manufacture of dynamite, by virtue of its property of absorbing and holding in suspension several times its weight of oily substances, such as nitro-glycerine. It is used also as an ingredient of soaps, the cleaning powers of which it assists principally by its mechanical action. It also affords a source of silica in the manufacture of the so-called soluble glass, or silicates of the alkalis. It is used in the manufacture of extremely light bricks and other compositions for fire-proof linings of magazines and the like, and in similar compositions as a filtering medium for water, and for other uses less important.

TO MAKE anything like a good job of soldering, the pieces to be soldered must have all grease and dirt removed so as to expose the clean, bright metallic surface. This is best and easiest done by the application of some acid. Muriatic acid is as cheap and as easily applied as any. It is prepared as follows: Into an earthen jar or cup put about one ounce of muriatic acid, into which drop small pieces of zinc until it ceases to boil. When the acid has cooled pour it into a four-ounce bottle and add sufficient water to fill the bottle about three-fourths full. The acid is applied with a swab, after which a thin coating of solder is rubbed over the surfaces with a soldering iron. When dissolving the zinc in the acid care should be taken to avoid inhaling the fumes which arise during the resultant "boiling."

NOTICES OF LOCATION are always to be liberally construed. A notice of location of a mining claim which describe it as bounded on the east by H. Mine, and as being a quarter of a mile south of the B. road and about 2 miles east of C., sufficiently describes the claim with reference to natural monuments. The law will not hold the locator of a mining claim to a strict and technical observance of the statute in respect to the terms of his notice, so long as he substantially complies with its requirements; and if it appears that the location was made in good faith, and if by any reasonable construction, in view of the surrounding circumstances, the language employed in the description will impart notice to subsequent locators, it is sufficient. A final notice of the location of a mining claim which fails to mention either the State or county of the purported location, but which refers to the preliminary notice posted by the locators as required by law, and recorded in the proper county, which latter notice named the county in which the claim is located, is a

sufficient compliance with Rev. St. U. S., Section 2324, requiring all records to contain such a description of the claim located, by reference to some natural object or permanent monument, as will identify the claim.

If a hole were bored through the earth, and if all friction and resistance to the passage of a ball dropped into this hole were eliminated, the only force acting being that of gravity, the ball would fall with an increasing velocity till it reached the center of the earth. At that point it would have its greatest velocity and momentum. It could not stop there. It would pass beyond the center of the earth as far as it had fallen to reach it—that is, it would go through the earth to the other side and then fall back to its place of starting. This it would continue to do forever under the conditions imposed. The motion would be no different from that of the pendulum of a clock, which oscillates under gravity alone as readily as any other falling body. A pendulum is a falling body, exactly like the supposed ball dropped into the earth. It falls to its lowest position and rises as far beyond it as it has fallen, just like the ball dropped into the earth. The mechanism of the clock is simply designed to restore to the pendulum the energy which it loses in each swing because of the friction of the air and other frictions in its motion. These the freely falling ball, by the conditions of the question, would be freed from. Hence it would move forever without loss of energy. If this be disputed or denied the disputant or denier can bore the proposed hole and try it for himself.

THE old method of making potassium cyanide was to take dehydrated ferro-cyanide of potassium and heat it with potassium carbonate— $2K_2Fe(CN)_6 + 2K_2CO_3 = 10KCN + 2KCNO + Fe + CO_2$. The resulting cyanide contained cyanate, but this did not materially interfere with its use. An almost pure cyanide can be obtained by heating the ferro-cyanide alone until it decomposes into potassium cyanide, nitrogen, and a compound of iron and carbon— $K_4Fe(CN)_6 = 4KCN + N_2 + FeC_2$. This method entails the loss of one-third of the nitrogen contained in the ferro-cyanide, and to avoid this waste of nitrogen it is now not uncommon to add the proper amount of an alkali metal to the melted ferro-cyanide— $K_4Fe(CN)_6 + 2Na + 4KCN + 2NaCN + Fe$. It is in this way that the most of the so-called chemically pure potassium cyanide now sold is made. The product is not a pure potassium cyanide, but a mixture of potassium and sodium cyanides. It also contains a considerable quantity of potassium carbonate, which is added to it during the course of manufacture to reduce its strength, for the combined cyanides, made according to the above formula, have a higher percentage of cyanogen than chemically pure potassium cyanide could possibly have. An inert material like potassium carbonate is therefore added in sufficient quantities to reduce the cyanogen contents to 39-40%, which is equivalent to 98-100% cyanide of potassium.

The legal measurement of water in California is the miner's inch, which is the quantity of water that will flow through an opening of 1 square inch, under a pressure of 4 inches above the top of the opening. A miner's inch is equivalent to a flow of 1.394, theoretically 1.57 cubic feet, or 8.976 gallons per minute. The velocity of running water is measured by the same laws as that of heavy falling bodies. A falling body increases its velocity in proportion to the time it is falling; and the distance fallen is in proportion to the square of the number of seconds of time it is falling. The theoretical velocity of water flowing out of an aperture of 1 foot is 8.02 feet per second; experimentally it is but 5.4 feet. The velocity of a stream of water flowing from a ditch, or other source, is equal to that which a heavy falling body would acquire in falling from a height equal to the distance between the surface of the water and the middle of the orifice. This distance is called the head of water. The quantity of water issuing from an aperture is in proportion to the square root of the head, and the velocity is in proportion to the square root of the head. With an aperture 1 inch in height the head of water under a 4-inch pressure would be 4½ inches. The square root of a 4½-inch head is 2.12 inches and of a 6½-inch head 2.55 inches. Therefore, an opening that will allow the escape of 100 inches of water under a 4-inch pressure will in the same length of time under a 6-inch pressure discharge 120 inches. The work which water can do is in proportion to the quantity multiplied by the square of the velocity; that is, the work is in proportion to the square root of the cube of the head. By means of the following rough-and-ready rule the quantity of water flowing in a ditch or stream may be approximately determined: Select some point where the flow of water is about the same for a distance of, say, 50 feet. Then make a number of different measurements to find the average width. In like manner make a number of measurements in the middle and along the slope of the banks of the stream or ditch, to ascertain the depth of the water; add these measurements together and divide by the total number of measurements made to ascertain the average depth. Then, to find the velocity, place a piece of heavy wood in the stream and as accurately as possible rate the time required for it to pass over the distance above mentioned. Multiply the area by the main velocity and the product is the volume in cubic feet; divide the number of cubic feet by 1.57 and the result will be the number of miner's inches. Take, for example, a stream of the average width of 100 inches and average depth 10 inches, with an average velocity of 5 feet per second: $100 \times 10 \times 5 = 5000$ cubic feet; $5000 \div 1.57 = 3184.71$ miner's inches.

The Credit of Mining Engineering.

Written for the MINING AND SCIENTIFIC PRESS by C. H. FITCH.

There is in the State of Kansas a man who has recently made a most notable advance in higher mathematics, in the practical solution of equations. This work is recognized the world over by university professors in this special branch of science, but I venture to say that the average reader even of engineering journals would be puzzled to name the man, or to explain what he had done to be credited to the American account in the advancement of science for the benefit of the whole world. It may be too much to expect that so abstruse a subject as the higher mathematics can be made to take hold of the popular imagination. It is said that one of the most honored correspondents of (in its sphere) a great mathematical society died recently, recognized by his technical fellows as a man of rare genius, but known to his local neighbors only as a market gardener who sold them ordinary vegetables.

After college graduation I, like many others, have spent some years of laborious study largely devoted to work in advanced mathematical courses. In the stress of commercial work less favorable to concentration of mind on abstruse studies than market gardening I have "backslidden." I am no more than within shouting distance of such achievements as I have mentioned. I can follow and define what has been done with difficulty, but I have lost all reserve force and power of origination in such work.

Imagine the great mathematician, his ponderous brain teeming with calculations and conceptions such as ordinary mortals "wot not of," jogging along on his vegetable wagon. Past him rushes the tallyho, cutting a wide swath of notoriety with its red paint and varnish and loud hughle calls, bearing members of the "smart set" whose pictures are already in press to announce to a news-hungry public that such and such persons have achieved the unique distinction of going to see a show. No doubt each party to this comparison has his own sphere and his own reward. I note the contrasts. I do not quarrel with them. To popularize mathematics may be neither possible nor desirable.

But there are less extreme tasks which lend themselves better to popular interest. It is possible, and legitimate and desirable, to popularize mining in the public estimation. In this subject mining, miners and mining engineers constitute one united interest. What position is taken by this fraternity as a factor in the national life? A useful and important one, no doubt, but it might be made still more useful and more important. It might command a larger measure of public interest. It might have a secretary in the President's cabinet. When its national conventions are held at Milwaukee, or Boise, or Butte, they might not be considered as side shows and unessential affairs, to be dismissed with a paragraph like the synd of some small sect.

To enhance popular interest in mining helps everybody and everything connected with mining. And mining, in turn, will help the people more than they realize. We may toil at other industries in competition as hard as we please, and have only our labor for our pay, but in the mining product we strike the keynote of values and obtain from it not only intrinsic worth, but the power of distribution which justifies wealth and puts it where it will do the most good, namely, in the hands of live people.

The issue of all politics and statesmanship the world over is rapidly gathering into one portentous question: Shall the wealth which is being produced in ever increasing abundance be used to promote life or to stifle it? Shall our civilization go forward or shall it recede?

In the answer to this question, in the decision upon it, mining has the conclusive vote. Conservatism and restriction in the general commercial world tend ever to hoard and tie up wealth, to take it away by process of law from the mouths that need to be fed, the bodies that need to be clothed, and the minds and souls that need to be educated, nourished and equipped with vital interest. These are the essential things, and avarice with its cash account, fearful of loss of a penny of profit, undoubtedly does tend to crowd them to the wall. Then social discontent arises and there is a movement to break the law that binds too hardly upon life as a woman might break her corset steels. Some execrate plutocracy, others execrate anarchy, and when they get at each other's throats in earnest the strife will be very nasty and very deadly.

But mining of the precious metals in ever increasing abundance comes as a mediator to prevent this strife. It reduces the value of the hoard, takes the edge off from avarice, removes the restrictions put upon life. Every ounce of gold redeemed from the grasp of the hanks of nature in the mountains of the West loosens an ounce of gold in the grasp of the banks of man in the cities of the East. In the prosperity of gold mining the field of opportunity in life is widened for every laborer. It affects favorably even every negro picking cotton in the South, and every mill hand in the woolen mills of the North. It is as necessary to the farmer as his wheat, and to the machinist as his tools.

The people do not realize these things. They do not know what a good brother they have in mining.

If they did they would insist on a mining secretary in the cabinet, and they would insist that no artificial restriction should be placed on the right preservative of all commercial rights, the right to get value, determining value out of the ground.

The miner has something more than the natural and laudable desire that his work and profession should have a large and honorable place among other professions. He has a public duty and service in making it strong and influential and popular.

The technology of the subject is all right, treatises are all right in their way, but they do not affect the strong popular interest and sympathy which should pervade every class with respect for mining. We look to the mining papers to arouse this kind of interest, and, while a large work remains to be done, it is a simple matter of fact that the MINING AND SCIENTIFIC PRESS comes nearer to filling the measure of its opportunities in this line than any other publication. I say this not because I am writing for the MINING AND SCIENTIFIC PRESS, but I am writing for the MINING AND SCIENTIFIC PRESS because I feel this fact, and incline toward the paper as one flame inclines toward another.

I do not underrate the value of the technical articles, not only the articles which come from the proceedings of engineering societies and make good copy and give good information to readers of several journals, but the exceptional rich fund of original contributions which are peculiar to the columns of this paper, and which come from practical and technical men in position to observe and report facts of great value. Yet I think that the fact that the MINING AND SCIENTIFIC PRESS draws to itself so many of these is due largely to the other fact that mining men like the MINING AND SCIENTIFIC PRESS and turn to it naturally with a home-like sense, a sense that they find in it good company and an honest, genial and fitting representation.

The MINING AND SCIENTIFIC PRESS is always interesting. Its news is seasoned with humor. It is not too stilted to admit an anecdote or a campfire story. It relaxes in amiable spirit, but never, I believe, in its disposition to hew close to the line of truth in representing the facts about mining properties. It brings us into close and vital touch with mining and the miner's life. It is the most popular of mining papers.

For this reason it is the best influence we have in the large and growing work to be done in popularizing mining. I feel that this work requires to be pushed, that it may be made to avert the most serious political dangers, and that if there were no politics it would still be an entertaining and beneficial work. The problem is to make the tale of mining so interesting that it shall draw, even like those other tales which were strong enough "to draw children from their play and old men from the chimney corner."

I am persuaded that the subject in itself has all this power of magnetic interest. There remains the ability to call it into action, for the good credit of mining engineering.

Electro-Metallurgical Industries of Germany.

There are seven copper works and the total copper production of Germany has increased from 24,700 to 32,000 tons in the last ten years. The Hoepfner copper process is there in diminished use. Only a small quantity of copper is produced there at present, and the production of copper at that plant may be given up, "because copper-nickel matte is not available." The Elmoro process, in use at Schlarden for making copper tubes, has reached approximate perfection. At a Hamburg refinery about 3000 kilograms of fine gold are produced yearly by the Wohlwill process, the anodes being of raw gold, 980 fine, with impurities of platinum and silver. From the sludge about twelve to fifteen kilograms of platinum are obtained. Quantities of Transvaal gold, down to 850 fine, are electrolytically refined. The electrolytic zinc industry is languishing. The deposition of pure solid zinc is impossible, if the solution contains many impurities. Zinc is more electropositive than hydrogen and can be obtained from neutral or slightly acid solutions only for the reason that a higher E. M. F. is required to make a hydrogen ion give off its charge at a zinc electrode than at an electrode of most other metals. If the solution contains impurities of metals which are more electronegative, these are preferably deposited, with the result that the cathode is then no longer pure zinc, but is mixed with other metals, by which a hydrogen ion gives off its charge more easily than a zinc ion. The most dangerous impurity is iron. In reference to the troubles in the analytical examination of zinc by electrolysis, if iron is in the solution, as long as there are much more zinc ions than iron ions zinc is deposited; but when the ratio of the number of iron ions to that of zinc ions reaches a certain value, iron is deposited, together with the zinc. The cathode then contains iron, and at this iron hydrogen ions can give off their charges more easily than zinc ions. Zinc is dissolved with vivid development of hydrogen and disappears from the platinum pan. This is brought into connection with the influence of current density upon the form of the zinc deposit. When a pure zinc salt solution is electrolyzed with a pure zinc cathode, zinc is deposited and hydrogen appears only at high current densities.

Mining Asbestos in Canada.

W. MOLLMAN.

The principal localities in the province of Quebec where asbestos is mined are Black Lake and Thetford. The asbestos is there found in narrow fissures 1 to 1½ inch in width of the belt of serpentine. The fibers are generally perpendicular to the walls of the stream. Although the veins seem to run in all directions, yet on closer examination a certain order is discernible. Foremost among the latter is the grouping of the fissures in long-drain zones, which again may include narrower and richer ones. It does not always follow that by penetrating deeper the veins enlarge. In fact, the reverse is often the case.

As long as the genesis of asbestos is not thoroughly understood, we shall not be able to set up definite rules and methods, as obtain in the mining of ore and coal, to assist in the opening and development of asbestos mines. I surmise that the formation of asbestos from the serpentine magma was materially influenced by granitic eruptions. The frequent occurrence of fissures running in all directions in the serpentine gives evidence that the area must have been subjected to intense disturbances after the cooling or solidification of the serpentine. The effect of these disturbances causes the greatest difficulties in the development of an asbestos area.

The mining of asbestos is carried on by quarrying. As the fissures or seams are small, it naturally follows that a great deal of dead matter has to be moved. The serpentine carries on the average from 3% to 4% of asbestos, and rarely does it reach as high as 6%. Dynamite is used as the explosive, and is put into 10 to 12 feet deep drill holes. In out-of-the-way places the hand drill is still used, otherwise steam or compressed air is utilized. The broken rock is reduced to smaller pieces by means of heavy sledges and steel wedges, and then smaller hammers are used for separating the asbestos from the gangue. The latter work is done either in the quarry or under cover when a purer asbestos is desired. For this work boys from fourteen to sixteen years of age are employed. As magnetic iron ore is sometimes found in the asbestos, particular attention must be paid that the fibers are not unnecessarily damaged in separating the mineral. This treatment furnishes what is known as "crude" asbestos, which is then ready for shipment in bags of 100 pounds. There are two grades, crude No. 1 and crude No. 2.

On account of the relatively small percentage of asbestos in the rock blasted, it is necessary to have special appliances for moving the latter. For the smaller mines the ordinary crane answers, but for larger ones the crane is supplemented by cables. In the latter case the cable is put at an angle of not less than 30°, so as to utilize gravity in returning the pit boxes to work. It is evident that by either of the above two methods the area that can be served is very limited, and this has led to the introduction of cable derricks with tail rope. In applying the latter means a cable 1½ inch in diameter is stretched across two masts from 30 to 60 feet high. One end of the cable is fastened to some high point in the quarry, while the other end is fastened on the other side of the mast, and distant as far as possible from the foot of the mast. By means of the endless cable the engineer is enabled to lower the pit box quickly, and to hold it at any desired point. The hoisting cable (¾ inch) brings up the load. The pit boxes are shallow wooden boxes lined with sheet iron, and carry from one to one and a half tons. After being hoisted to the surface they are either loaded directly onto wagon frames or are dumped into larger dumping cars, and then moved by horse or steam power. For hoisting, twin steam engines of from 15 to 20 H. P. are used.

A few words may be added about the treatment of the less valuable asbestos. This latter consists of waste (mostly serpentine) from the crude asbestos, and of larger pieces of serpentine traversed by small veins of asbestos, which, however, it would not pay to treat by hand.

The extraction of the fiber from this inferior material is done by machinery in asbestos mills. The broken material, or at least the smaller pieces, is first subjected to a drying process in rotating cylinders; it then passes through some stone crushers and rollers, whereby it is reduced to a given fineness, when it passes into the cyclones, where further reduction takes place, especially the disintegration or separation of the individual fibers. This process (centrifugal) continues until the rock is ground to sand and the asbestos fibers are thrown onto the separating sieves. From the latter the fibers are drawn away by exhausts, and the sand is blown into bins. Nothing remains now to be done but to fill this asbestos, known as "paper stock," into bags of 100 to 150 pounds for shipment. According to quality it is designated as No. 1, 2 or 3. Crude asbestos, No. 1, sells from \$150 to \$250 and No. 2 from \$80 to \$150 per ton. Paper stock runs from \$20 to \$40 per ton. To explain the difference between the above prices it is necessary to state that in the different mines for a given class different prices obtain, depending upon the length of the fiber and upon the per cent of impurities.

At the present time there are in Canada twelve

asbestos mining companies, with a capital of \$4,000,000, the mines employing at present about 3000 men. Difficulty is experienced, especially during the summer months, in obtaining sufficient labor, and efforts are made to obtain the requisite supply. The wages for a ten-hour shift are from \$1.25 to \$1.50.

Recent Rock Drilling Contest.

In last week's issue was given the results of the recent rock-drilling contest at Idaho Springs, Colo., on the 4th, 5th and 6th inst. During this week have



Leyner and Sullivan Machines Drilling Uppers.



Owen Williams Operating Ingersoll Drill.

been received sundry photographs and details. In all \$400 was given in prizes. The Idaho Springs Gazette contains an excellent account of the contest, which was of considerable interest. Each crew of two men to a drill, set up and drill two holes, tear down and replace as found; of the two holes to be drilled one was to be above the horizontal and one below, the angle in each case not to exceed 25°; each hole was to be 9 feet deep, the gauge of the finishing drill to be 1 1/8 inch; the size of the drilling machine to be not over 3 inches air cylinder; air pressure to be maintained at 110 pounds, judges' decision to be final. It was a fight to a finish on the part of eleven of the contestants; three makes of machine drills were used. The accompanying tabulated record, as taken from the Gazette, gives the whole thing in detail:

quicksilver produced in California, 20,950 flasks were received at San Francisco, the remainder being shipped East. There was very little variation at San Francisco during 1901 in the price of quicksilver, which ranged from \$46 to \$48 per flask for domestic and from \$44 to \$45 per flask for export. The exports from San Francisco during the year amounted to 5337 flasks, valued at \$242,908, practically the entire quantity being shipped to Mexico and Central America. Notwithstanding the increased production of 1410 flasks, the stock in sight unsold on Jan. 1, 1902, including that at New York, was but 2230 flasks. In California two new mines have been added to the list of producers—the Karl mine and the Libertad

mine, both in San Luis Obispo county. The largest producers were the New Idria, in San Benito county; the Napa Consolidated, in Napa county, and the New Almaden, in Santa Clara county, the production of these being about equal. California has produced nearly all of the quicksilver obtained in the United States, and in the fifty-two years since 1850, inclusive, the grand total of California's production has amounted to 1,884,059 flasks of 76 1/2 pounds net—an average of 36,231 flasks per year. Of this great amount, one mine, the New Almaden, in Santa Clara county, has produced a little over 50%.

The mining and smelting of quicksilver ore in Texas

Order of Drilling.	Make of Drill.	Runner.	Helper.	Time Setting Up.			Time First Hole.			Back or Down Hole.	Time First to Second Hole.			Time Second Hole.			Back or Down Hole.	Time Tearing Down.			Total Time.			
				H.	M.	S.	H.	M.	S.		H.	M.	S.	H.	M.	S.		H.	M.	S.	H.	M.	S.	
1.....	Ingersoll	W. W. Rogers.	H. C. Stull....	0	4	35	0	24	15	Back	0	1	20	0	34	30	Down	0	4	15	(1)	1	9	5
1.....	Leyner	Gustavison....	Gustavison....	0	6	0	0	27	50	Down	0	1	10	0	27	40	Back	0	3	31		1	6	11
2.....	Ingersoll	A. S. Pierce.	J. D. Sullivan.	0	4	35 (2)				Back							Back					0	38	30
2.....	Leyner	J. Nelson.....	J. McIsaac....	0	9	5	0	21	25	Back	(3)						Back							
3.....	Sullivan	G. A. Howatt.	P. Brennan....	0	6	0	0	25	0	Back	0	1	0 (4)	1	0	45	Down	0	3	21	(4)	1	36	6
3.....	Leyner	A. Strom.....	A. Miller.....	0	5	45	0	22	0	Back	0	0	20	0	17	20	Down	0	3	35	(5)	0	49	0
4.....	Ingersoll	O. Williams....	A. Horn.....	0	5	15	0	24	45	Back	0	1	30	0	37	30	Down	0	7	0		1	16	0
4.....	Leyner	J. W. Smith....	J. A. O'Donald	0	7	0	0	46	0	Down	0	9	45	0	28	0	Back	0	3	45	(6)	1	34	30
5.....	Sullivan	D. Shea.....	G. Fuller.....	0	4	15 (7)				Back							Back							
5.....	Leyner	A. Barlow....	A. Gooch....	0	6	20	0	22	10	Back	0	1	0	0	19	30	Down	0	3	9		0	52	9
6.....	Sullivan	A. L. Owen....	J. McCormac..	0	5	0	0	24	0	Back	0	1	0 (8)				Back							
6.....	Leyner	H. Hauser....	T. Grasser....	0	3	30	0	25	15	Back	0	2	45	0	40	30	Down	0	2	40	(9)	1	12	40
7.....	Ingersoll	O. Wing.....	C. Rydland....	0	4	30	0	33	0	Back	0	0	0	0	34	30	Down	0	3	13		1	17	13
7.....	Leyner	G. Carlson....	E. Shannon....	0	3	45	0	22	55	Back	0	0	50	0	18	30	Down	0	3	0	(10)	0	49	0
8.....	Sullivan	F. Arlington.	W. Hand.....	0	3	30 (11)				Back							Back							
8.....	Leyner	T. F. Howard.	J. Mathews..	0	3	25	0	24	50	Back	0	0	30	0	17	15	Down	0	3	0	(12)	0	49	0
9.....	Ingersoll	T. Vivian....	A. Gooch....	0	4	10	0	31	50	Back	0	1	30	0	29	0 (13)						1	6	30
9.....	Leyner	B. Zeller....	G. Wehman....	0	4	30	0	19	15	Back	0	0	45	0	17	10	Down	0	3	10		0	44	50
10.....	Sullivan	W. Gartrell..	W. Irvin.....	0	4	10	0	28	20	Back	0	1	0	0	23	40	Down	0	3	10		1	0	20
10.....	Leyner	A. Ellison....	A. Fredman..	0	3	30	0	17	30	Back	0	0	30	0	17	50	Down	0	2	55		0	42	15
11.....	Ingersoll	W. Bennett..	C. Rowe.....	0	4	0	0	52	10	Down	0	2	20 (14)				Back							
11.....	Leyner	T. Grasser....	H. Hauser....	0	2	50	0	18	10	Back	(15)													
12.....	Ingersoll	A. Fredman..	A. Ellison....	0	10	45 (16)																		

(1) Second hole 4 1/8 inches short; disqualified.
(2) First hole "fitchered;" contest abandoned; no record.
(3) Second hole ran into old hole; contest abandoned; no record; changed machine; no time allowance.
(4) Back head broke; 17 minutes 45 seconds allowed for changing machine.
(5) First hole 3 inches short; disqualified.
(6) Time of first hole includes 6 1/2 minutes change of machine; no allowance.
(7) Ran into old hole; contest abandoned; no record.
(8) Broke steel in second hole; contest abandoned; no record.
(9) The 40 1/2 minutes include 15 minutes drilling, 5 feet 1 1/2 inch on second hole, which ran into an old hole and was abandoned and a third hole drilled.
(10) First hole, 9 feet 3 inches; second hole, 9 feet 3 1/2 inches.
(11) Contest abandoned; first hole "fitchered."
(12) First hole, 9 feet 3 1/2 inches; second hole, 9 feet 3 1/4 inches.
(13) Abandoned contest before completing second hole; no record.
(14) "Fitchered" in second hole; contest abandoned.
(15) Ran into old hole and abandoned contest before finishing first hole.
(16) Six and one-half minutes allowed for changing valves on machine; "fitchered" in first hole at 37 1/2 minutes total time; abandoned contest.

Extraction of Gold by Chlorobromuration.

C. GROLLET'S PROCESS—(CONDENSED)

NUMBER II.

The screens most generally used in the stamping of gold ores are No. 30. Between the largest grains and the impalpable slimes there is a difference so great that it is necessary to effect a classification by equivalence and to treat each size in separate apparatus. Wet stamping produces 30% of fine dust that resists filtration. In the Transvaal it is treated in two different ways: (1) In special tanks provided with automatic distributors, and (2) in causing the pulp to pass into Spitzluten with ascending current, and then into Spitzkasten. At the Crown Reef, where the MacArthur-Forrest process is used, the pulp classified in Spitzluten and Spitzkasten gives large sands, medium sands, fine sands and slimes. The first (concentrates) represents 5% to 6% of the weight of the ore, and contain 33% of pyrites and 32.77 grams of gold to the ton. They are treated by cyaniding. The treatment lasts sixteen to eighteen days; the residues contain 2.95 grams of gold to the ton, representing a theoretical yield of 90% to 92%. By theoretical yield is understood the difference between the contents of the ore and the contents of the tailings. The medium sands, slightly pyritic, are in the proportion of 7% or 8%. They contain 15.43 to 18 grams of gold to the ton. They are treated by cyaniding, the operation lasting seven to eight days. The residues contain 2.34 grams of gold to the ton, the theoretical yield being about 80%. All the rest of the pulp, fine sands and slimes go into the tanks provided with automatic distributors.

At the Worcester mill, where the Siemens' method is used, the pulp classified in Spitzluten gives four categories of products. The results of the operations are recorded in Table II. The medium sands and fine sands are treated together, the slimes are not treated. The average theoretical yield is 74.6%.

TABLE II.

Gold Contents of Tailings (Grams) per Ton.....	Duration of Treatment in Days.....	Gold Contents of Tailings (Grams) per Ton.....	Theoretical Yield percent.
15% of large pyritic sands...25.71	9	2.57 to 3.43	85.66 to 90.0
50% of medium sands.....10.30	5	1.73 to 2.16	79.03 to 83.2
10% of fine sands 7.71	5	1.73	77.56
25% of slimes... 7.71	..	....	....

The slimes carried away by the water leaving the distributor tanks and Spitzkasten are deposited in pits or in reservoirs, whence the clarified water returns to the stamps. The following figures (Table III), referring to the Crown Reef mill, show the proportion of the different products, their gold contents and the losses of gold:

TABLE III.

Operations.	Gold Lost per Ton Stamped. Grams.	Gold Recovered per Ton Stamped. Grams.	Per Cent.
Amalgamation—Ore stamped: 180,700 tons.....	10.50	57.20	..
Concentrates cyanided: 5,700 tons, or 3%.....	1.04	5.66	0.11
Sands cyanided: 119,200 tons, or 66%... 3.30	19.07	1.45	7.90
Slimes: 55,800 tons, or 31%.....	....	1.75	9.53
	15.04	81.95	3.31
			18.03

Mr. Grollet's experiments were made on three ores, two of which were poor, the third an ore from the Transvaal.

The first of these ores was from the Puy-de-Dome, France. It had been concentrated on a special table. The results were as follows:

TABLE IV.

Original Ore. %	Pulp. %	Tailings. %
Silica..... 89.40	16.20	98.10
Silica and clay... ..	....	0.74
Alumina.....	....	Trace
Antimony..... Distinct trace	5.14	....
Metallic iron..... 4.15	35.70	....
Ferric oxide.....	....	Trace
Sulphur..... 5.28	41.66	....
Lime..... Distinct trace	Trace	0.93
Totals..... 98.83	98.70	99.77
Gold, per ton, (grams)..... 1.50	16.0	Nil

The second of these ores was obtained from North Wales. This ore had been concentrated, like the first, after dry stamping, through a dry screen, on the same special table. The analyses of the ore, of the pulp and of the tailings gave the following results (1000 kilograms of ore gave 100 kilograms of concentrates and 900 kilograms of tailings):

TABLE V.

Original Ore. %	Pulp. %	Tailings. %
Silica..... 98.30	91.30	98.50
Lead..... 0.28	2.27	....
Metallic iron..... 0.21	2.96	....
Ferric oxide and alumina ...	....	1.20
Lime.....	....	Trace
Sulphur..... 0.37	4.01	Nil
Totals..... 99.16	100.54	99.70
Gold, per ton (grams).... 3.0	34.0	Nil

The third of these ores was obtained from the Transvaal. It had been concentrated in a similar manner. It gave the following results (a ton of ore yielded 46.5 kilograms of pulp and 953.5 kilograms of tailings):

TABLE VI.

Original Ore. %	Pulp. %	Tailings. %
Insoluble gangue..... 93.100	5.70	97.20
Iron..... 3.010	43.16	2.06
Alumina..... 1.320	Nil	Trace
Lime..... Trace	50.22	Nil
Sulphur..... 1.372	99.08	99.26
Totals..... 98.802	99.08	99.26
Gold, per ton (grams).... 20.0	390.0	2.0

These experiments show that in many cases all or nearly all the gold contained in an ore may be concentrated, and that it is separated into two classes—the pulp and the tailings. The washing of the auriferous pulp is carried out in favorable conditions, the filtration not being difficult. As regards the treatment of the tailings, it is only carried out if the gold contents renders it worth while, and this is rarely the case. If it is, the tailings are after treatment washed with the aid of a filter press.

C. ROASTING.—The roasting of ores is either oxidizing or chloridizing.

(a) OXIDIZING ROASTING.—Oxidizing roasting is based on the following principles: When an ore or mineral product, consisting essentially of metallic sulphides, is placed in a bed some centimeters in thickness, 0.150 to 0.200 meter, in a reverberatory furnace (fixed reverberatory furnace, reverberatory furnace with movable hearth, or reverberatory furnace with rotating cylinder), and submitted to a temperature sufficient to give effect to the affinity of the sulphur and of the metals that are combined with it, to the oxygen of the air introduced into the apparatus, a liberation of sulphurous anhydride is brought about, and this has but little tendency to combine with the metallic bases, and, consequently, free oxides and metallic sulphates are the products that are formed.

Many metallic arsenides behave in an analogous manner in the same circumstances. Simultaneously with the liberation of arsenious anhydride, free oxide and metallic arseniates are formed, chiefly the latter, and, more rarely, arseniates.

The sulpho-arsenides and the mixtures of metallic sulphides and arsenides similarly bring about a liberation of sulphurous and arsenious anhydrides, and the formation of either metallic sulphates and arseniates, or of free oxides and arseniates.

In certain circumstances metallic antimonides may be obtained—as, for example, when the ores to be roasted are metallic sulphides containing in the state of combination or of mechanical mixture some antimony sulphide. The latter is charged by roasting into a combination of antimony acid (Sb_2O_5) and antimony peroxide (Sb_2O_4), while part of the antimony is liberated in the state of antimony peroxide.

(b) CHLORIDIZING ROASTING.—The reagent most generally employed in the metallurgical processes of roasting is the oxygen of the air. This plays the most important part in all the operations designed to bring an ore, or crude product, to a state of oxidation suitable for the subsequent treatment.

In certain cases, however, the substances are acted upon, in addition to oxygen, by another body—chlorine, in the form of sodium chloride. This agent is employed in the metallurgy of gold, when it is desired to convert certain metals (silver, lead, copper) or certain bases (lime, magnesia) into chlorides, so that during the chlorination the free chlorine can no longer act upon them.

(c) LOSSES OF GOLD DURING ROASTING.—When the ores or crude products, consisting essentially of metallic sulphides or sulpho-arsenides containing gold, that metal remains in the state of a simple body extremely finely divided in the product of the oxidizing roasting, while the other metals are changed into oxides, sulphates or arseniates. In fact, at the temperature of roasting, the gold does not experience any oxidizing

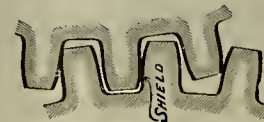
action either from the oxygen of the air or from the vapors of free sulphuric acid. Nevertheless, experience in various quarters has shown that during the metallurgical roasting of auriferous matters losses of gold are produced. Numerous experiments on this subject have been made by Mr. Grollet. He has roasted at low or high temperatures, for long or short periods, mixtures of finely divided metallic gold obtained by precipitation by sulphuretted hydrogen, or metallic sulphides and arsenides rich in gold, produced artificially, with ores or other non-auriferous substances. The results of these experiments have led him to admit that the loss of gold is produced only when the roasting is carried out too energetically, and when the volatile products of the roasting carry with them very thin particles of gold. It is probable that when a considerable loss of gold is thought to have been observed in roasting, the inference is really based upon the results of an imperfect average assay or an erroneous quantitative determination of the metal contained in the ore roasted. Aidarow, in a paper on the non-volatilization of gold in the roasting of crude matters (Bergwerksfreund, Vol. XVIII, p. 1), directed attention to the difficulty presented by the exact determination of gold by the dry assay—that is to say, by fusion with pure lead and cupellation, a difficulty resulting from the loss of the gold particles, either mechanically retained by the sides of the crucible in which the fusion is effected, or absorbed in the cupel.

(TO BE CONTINUED.)

Lubrication of Gearing.

Lubrication of teeth of gearing is a subject worth attention. The idea that waste lubricants from bearings, engines and machinery generally are good enough to apply to gear teeth is based on the conception that gearing must wear by reason of frictional contact in transmission of power—that its life is dependent solely upon how well proportioned for its work, without regard to lubrication. But there is a difference between the lubrication of a bearing for a revolving journal and that of gear teeth, in which even the rolling effect at pitch line may be lost through inaccuracies of ordinarily constructed gear teeth. Gear teeth are constructed to have little side clearance between the teeth when engaged. Perfect working gear teeth would be those without side clearance.

Its freedom from tendency to form a built-up deposit admirably adapts petroleum products for lubrication, while it is equally evident from the action of gearing described a lubricant must possess tenacious qualities to adhere and build a deposit on the working surfaces of teeth, thus preventing metallic contact and consequent wear and noise, and with a like deposit on the opposite sides of teeth reduce side clearance and form a cushion for backlash, greatly



decreasing noise and destructive action. The accompanying illustration shows in the heavy lines on the sides of the teeth the effects of application of gear shield, in which the above described results are attained, evidenced in the prolonged life and greatly decreased noise of gearing on which it has been used in widely varying lines, from the fast running motor gearing on street cars to the most ponderous and heavily dutied gearing of rolling mills. Its efficiency has been demonstrated on gears not in themselves severely dutied, but subjected to dusty, gritty or atmospheric conditions, causing rapid wear. This gear shield is manufactured by The Ironsides Co., Columbus, Ohio.

Presence of Gold in Iron Pyrites.

How gold came to be present in quartz veins is very hypothetical. All that can be said is that it was evidently deposited from the solutions which gave rise to the formation of the inclosing quartz; and this appears the more evident from the presence of that metal in pyrites inclosed in siliceous incrustations, as well as from the fact of large quantities of gold having been formed in the interior of the stems of trees, which in deep diggings are often converted into pyrites. The constant pressure of iron pyrites in auriferous veins, and when so occurring its invariably containing a certain amount of gold, suggests the possibility of this sulphide being in some way necessarily connected with the solvent by which the precious metal was held in solution. It has been shown that finely divided gold is soluble in the sesquichloride of iron, and more sparingly in the sesquisulphate of that metal. It is also well known that iron pyrites sometimes results from the action of reducing agents of the sulphate of that metal. If, therefore, sulphate of iron, in a solution containing gold, should become transformed by the action of a reducing agent into pyrites, the gold, at the same time being reduced to the metallic state, would probably be found inclosed in the resulting crystals of that mineral—Prof. Whitney.

Oil Furnaces for Assaying and Melting.*

CHARLES BRENT.

In view of the fact that the use of oil fuel in many departments of metallurgy has been greatly extended during the past two years, a few practical notes on the use of oil, as applied to the furnaces necessary in the assay office and melting room, may be found of interest.

The furnaces described were designed by the writer mostly for use in my own laboratory and are the result of practical experiment in the use of oil for fuel for the past twelve years. Petroleum, either as gasoline, refined oil or fuel oil, can be used in any of the furnaces, and it will be found to possess advantages over other fuel wherever steam or compressed air can be obtained, or even comparatively light pressures from an ordinary blower. It will be found in most cases more economical than either charcoal,

nary soapstone footwarmer, hored and fitted with an iron ring for convenience of handling. Behind and above the crucible chamber is the muffle chamber, C, containing the muffle B. The walls of this chamber hug the muffle at the sides, the top and the end within $\frac{1}{4}$ -inch and the opening for the escape of the products of combustion is placed in the middle of the muffle. A small door, lined with a sheet of asbestos, closes the opening to the muffle, and a small shelf beneath this adds to the convenient working of the furnace.

This furnace can, with the right quantity of oil and air at eighty pounds pressure, be raised to the temperature for fusion for assays in less than ten minutes, and the muffle will be found at a suitable temperature for cupellation in fifteen minutes. Work can be carried on simultaneously in both crucible chamber and muffle, as the jet sweeps between the crucible and strikes at once into the muffle chamber. This furnace will make a set of fusions in twenty minutes, and by the use of a second jet of compressed air, E, into the mouth of the muffle, a set of cupellations on 10-gram buttons can be made in from seven to ten minutes. The fuel burned will be less than three-quarters of a gallon of oil, which, after the furnace

the oil is turned off, and there is no further consumption of fuel.

Fig. 2 (Plate 3) roughly illustrates the form of burner used by the writer with an ordinary pressure blower giving a pressure of 6 to 10 inches. The oil comes to the blast pipe through pipe A, its flow being regulated by stop cock B. The blast pipe is contracted to a nozzle, E, and the end of the pipe C is flattened, as shown in diagram. Fig. 3 (Plate 3) shows the ordinary high pressure burner which can be bought now from a number of firms manufacturing oil-burning furnaces for steam raising and forge work.

The air enters through a passage, H, its flow being regulated by needle B. It issues through the central orifice, F, and sprays the oil entering through a passage, C. The flow of oil is regulated by the cap E, which, when screwed up completely, closes the opening D of the passage C, without interfering with the passage of the air.

The furnace designated as Fig. 1 (Plate 2) was designed for washing and drying the gold precipitate from the chlorination process and melting the dried product. The precipitate is dried and washed in a

PLATE 1.

FIG. 1.

COMBINATION
MUFFLE AND CRUCIBLE
FURNACE

FIG. 2.

12 CRUCIBLE
OIL FURNACE

FIG. 3.

DOUBLE MUFFLE
OIL FURNACE

PLATE 2.

COMBINATION MELTING
AND
REVERBERATORY FURNACE

FIG. 1.

PLATE 3.

FIG. 2.
BURNER
FOR
LOW PRESSURE

FIG. 3.
BURNER
FOR
HIGH PRESSURE

OIL FURNACES
FOR
ASSAYING AND MELTING

coke, coal or gas, and wherever ordinary precaution is used, the risk from fire or explosion will be reduced.

The saving of time and labor in the use of oil fuel, as compared with solid fuel, must be known to be properly appreciated, and the ease of manipulation and the freedom from dust and ashes and outside heat will recommend this fuel.

The construction of all the furnaces is the same, in that they are all constructed of sheet steel, of suitable weight, according to the size of the furnace. The shells are lined with a plastic mass, composed of four parts of old assay crucibles ground to about 20 mesh and one part of good finely-ground fireclay. This mixture should be worked up with a small quantity of water and put in as stiff as it can be handled. After a day or two drying, a light wood fire is put in the furnace until the lining is thoroughly hard.

A little caution must be used the first time oil fuel is applied; but if the furnace is thoroughly dried, the heat may be pushed at once to the extreme limit required.

On cooling, the lining will be found pitted together by the small quantity of slag from the broken crucibles and will usually be free from cracks. Should any develop, they should be filled with a thin mixture of the lining material. This lining burns as hard as porcelain, and, as there are no ashes from solid fuel to slag the walls, it will be found practically indestructible.

The combination furnace shown in Fig. 1, Plate 1, was designed to hold six Battersea crucibles, size E or F, and a size J or H Battersea muffle. In the diagram A is the crucible chamber, with an opening below and in front to admit the jet of oil and steam or air. A convenient cover for the chamber is an ordi-

nary soapstone footwarmer, hored and fitted with an iron ring for convenience of handling. Behind and above the crucible chamber is the muffle chamber, C, containing the muffle B. The walls of this chamber hug the muffle at the sides, the top and the end within $\frac{1}{4}$ -inch and the opening for the escape of the products of combustion is placed in the middle of the muffle. A small door, lined with a sheet of asbestos, closes the opening to the muffle, and a small shelf beneath this adds to the convenient working of the furnace.

The furnaces designated as Figs. 2 and 3 (Plate 1) were designed to be worked together in an assay office handling ordinarily 100 assays and upwards per day. Fig. 2 is a crucible furnace designed to take in twelve size E or F crucibles in the chamber H, which is covered with three soapstone covers, B. The jet is admitted through an opening at the bottom and in front and the products of combustion escape through openings between the covers, B, which are arranged to slide apart for this purpose. If it is desired to hasten up the melting of the hack set of crucibles, an opening is left over them by sliding the covers apart. A suitable sheet iron hood about 3 feet above the furnace is connected with the chimney and serves to carry off all fumes, without interfering with the work at the furnace. This furnace will burn a gallon of oil every hour and will turn out a hatch of fusions every twenty-five minutes.

FIG. 3.—This is a double muffle furnace designed to hold two size K muffles, and the regulation of the heat in the two muffles is accomplished by the proper combination of the jet below and the draft above. Ordinarily the bottom muffle will become much hotter than the upper one; but, on increasing the air in the jet below and opening the draft above, the two muffles can be regulated to the same temperature. The furnace will burn from three-fourths of a gallon to one gallon per hour of oil, will be hot enough for cupellation in either muffle in twenty minutes and hot enough for scorification in twenty-five minutes. An obvious saving in fuel is made in furnaces of this size, as, in the oil furnace, the moment the work is done,

series of trays on the hearth B of the furnace, any part of which is accessible by sliding the covers, C. After drying and washing, the product is transferred while hot to the plumbago pot, A, which has during the washing attained a full melting heat. Any fume or dust is retained in an enlarged section of the shaft pipe, which can be opened and cleaned at suitable intervals.

Fig. 2 (Plate 2) shows a double-jet furnace, designed for melting hulsion. The jets form a tangent to the surface of the melting pot and form a whirling flame between the pot and the furnace walls, the products of combustion escaping through a hole in the center of the furnace cover. This furnace will be found rapid and convenient to use, especially on hulsion which requires a good deal of slagging and refining. Any melter who has stood over an ordinary coke furnace, filled with incandescent fuel, for an hour, will appreciate a melting furnace that at a touch can be so cooled off as to be worked over with no discomfort from either light or heat. The furnace can be placed anywhere in the melting room, requires no expensive smokestack, and takes up but little room. The furnace itself is ordinarily only 4 inches more in diameter than the crucible it holds, and is only about 4 inches higher. The rapidity of melting must be also taken into consideration. The writer has melted a thousand ounces of retort sponge and slagged it thoroughly clean in less than an hour with the consumption of $1\frac{1}{4}$ gallons of fuel oil, and has repeatedly melted twenty pounds of brass in less than half an hour with less than half a gallon of fuel.

Fig. 1 (Plate 3) shows an oil reservoir, with screen near the top and gauge glass on the side and connected below to a filter, which is simply an enlarged section of the supply pipe filled with coarse, clean sand. It will be found an important matter to free

*Condensed.

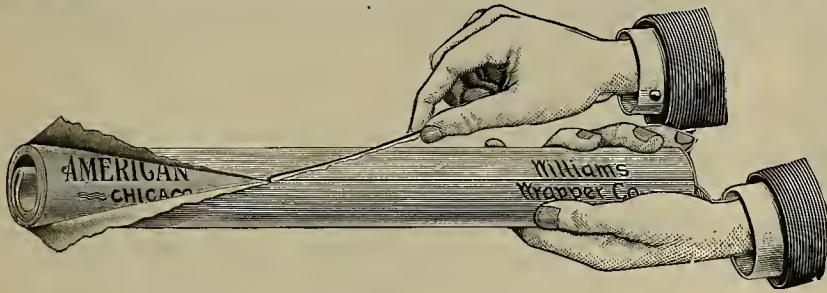
the oil from every trace of suspended matter, especially when using the high pressure jets, as the openings are so minute that a very small particle of grit will stop the flow of the oil. It will be found convenient to locate the oil reservoir at least 10 feet above the jets, to keep a proper head of oil on the burners.

This Paper's Wrapper.

Since this paper began being placed in the mails rolled, complaints have been received from subscribers regarding annoyance in opening the wrapper.

To obviate such inconvenience a new style of wrapper is adopted.

The attention of our subscribers and the trade generally is respectfully directed to the peculiar feature of the wrapper in which this paper is mailed each week. These wrappers have pasted inside of them a small black thread running from one end to the other, for the purpose of cutting the wrapper open automatically. As shown in the illustration, one end



of this thread should be grasped in one hand and the paper in the other, and with a sharp pull the thread cuts the wrapper open and the paper unrolls itself. Anyone who has gone to the trouble of trying to tear the wrapper open with the fingers, or even to cut it open with a knife, will appreciate at once the value of the device described. The new system goes into effect with this issue.

Water From Miner's Ditch.

The accompanying picture is interesting from the point of view of practical mechanics—a pump house and workshop, which show how water from a miner's ditch may not only be taught to pump itself to an elevation above the ditch, but furnish water for



The Pump House and Workshop at Jackson, Amador Co., Cal.

the mine shop besides. By means of a turbine wheel a pump is worked and saws and grindstones revolved. The outfit of turbine and pump was made in the vicinity by Knight & Co. of Sutter Creek, Cal. Its capacity at full stroke is 10 miner's inches. The turbine is 12 H. P.

A Multiplication-Addition Table.

The following table from Popular Mechanics is interesting to look at and ingeniously constructed:

1 time 9 plus 2 equals 11.
12 times 9 plus 3 equals 111.
123 times 9 plus 4 equals 1111.
1234 times 9 plus 5 equals 11111.
12345 times 9 plus 6 equals 111111.
123456 times 9 plus 7 equals 1111111.
1234567 times 9 plus 8 equals 11111111.
12345678 times 9 plus 9 equals 111111111.
1 time 8 plus 1 equals 9.
12 times 8 plus 2 equals 98.
123 times 8 plus 3 equals 987.
1234 times 8 plus 4 equals 9876.
12345 times 8 plus 5 equals 98765.
123456 times 8 plus 6 equals 987664.
1234567 times 8 plus 7 equals 9876543.
12345678 times 8 plus 8 equals 98765432.
123456789 times 8 plus 9 equals 987654321.

Treatment of Oxidized Ore.

In the vicinity of Victor, Cripple Creek district, Colorado, many of the veins are narrow, the gold in some instances occurring along the fracture planes of the rocks, these fracture planes becoming the narrow veins. In some cases, when thoroughly oxidized, the vein matter becomes a gouge which separates easily from the walls, and the veins being so narrow that a good deal of the wall rock must be broken down. The value of this broken material, taken as a whole, is low—too low to pay for working it—but the following method is used to concentrate the valuable gouge matter and make a good grade of material: The ore as it comes from the mine is put over bar screens having 1½-inch spaces. The ore going over the screen is usually considered waste, although roughly handpicked before going to the dump. What falls through the bar screen goes to a wire cloth screen with ¼ to 1-inch openings situated directly below the bar screen or grizzly. The material which passes through this wire screen contains all the loose fines (the gouge), which carry the value, and this grade of ore is generally high grade enough to ship. What passes over the wire cloth screen is mostly barren rock, to which, however, adhere particles of rich gouge. This material goes to the washer, which in

the larger plants is usually a revolving screen, having ¼ to ½-inch perforations, on which the ore is fed with a plentiful supply of warm water. The fine gouge matter is washed through the revolving screens and caught in settling boxes, where the excess of water is drained off and the resulting mud dried by means of properly arranged steam pipes beneath the boxes. In smaller plants this washer is a shallow rectangular box, in which is placed a perforated screen through which the fines collect in the lower part of the box. The ore is worked over on the perforated plate by means of a shovel, water being added, until the gouge is all worked off. Then the coarse rock is shoveled off and a fresh lot thrown on the screen. When the lower part of the box, below the screen, has become filled with fines, the screen is removed and the fines are shoveled on the drying floor to be dried. The fines obtained in this manner generally run three or four ounces gold per ton. The separated coarse rock runs about .15 ounce per ton.

Hydraulic Mining Failures.

If there is one branch of mining more than another that calls forth the ability, taxes the ingenuity, and at the same time exposes the weak points and ignorance of the mining engineer, it is the branch referred to in general as hydraulic mining, covering placer mining and alluvial mining, and, of late years, including gold dredging. Without doubt more money has been wasted and more ignorance displayed in connection with such ventures than any other kind of mining. It seems to be taken for granted, even by many men who have world-wide records as successful financial and business men, that mining ventures are easily handled—that it requires little or no training to successfully manage them, and it is a common occurrence to find mines in which large sums are invested in the hands of some friend of the president or relation of a director, who has been brought up in a large city and in many cases has never seen a mine, and has neither practical training nor experience. There are innumerable monuments of failures in which the above state of affairs may be traced for cause, in which many well-known successful financiers and business men have squandered fortunes of their own and of their friends. The sooner mining investors realize these facts the sooner will mining of all classes become a more legitimate form of investment.

The different forms of mining entitled to be grouped under the head of hydraulic mining include the most interesting and fascinating methods, and many of the various problems in connection with them that are continuously cropping up will always make this branch of mining the most enticing to professional mining men, as well as to investors.—George H. Evans in Cassier's Magazine.

AUSTRALIA is not a consumer or buyer of silver,

but a heavy producer and seller. London will be the chief silver market so long as England controls the trade of the East. Ultimately, of course, San Francisco will be the principal shipper of silver. That will be when the Pacific ocean becomes an American lake.

A 50,000-Volt Transmission System.

Twenty miles east of Helena, Mont., the Missouri River Power Co. has located its 50,000-volt power plant and transmission system at the town of Canyon Ferry. Ten years ago the project was first taken up; the present plant is the result. At the canyon's mouth a 480-foot dam has been thrown across the Missouri river and gives a working head of 30 feet, the canyon varying from 400 to 700 feet in width. It is about ½ mile long. There is sufficient water in the river at all seasons to develop a minimum of 10,000 H. P. Four years ago the plant was begun. It then consisted of four 750 K.W., 550-volt, two-phase generators, with two 90 K.W. exciters, the capacity of the plant being 4000 H. P. In the fall of 1900 the present plant began to take shape, the idea being to enlarge the old one to a capacity of 10,000 H. P. Six extra 750 K.W. generators, with the proper accompaniment of exciters, transformers and other apparatus, were therefore installed, to be driven by 45-inch turbines. All generators in the power house are direct connected to the wheels, flexible couplings being used throughout. With the new generators there was also installed a 225 K.W., 150-volt exciter, driven by a separate wheel, and a 115 K.W., 150-volt exciter, driven by an induction motor. The power plant now consists of ten 750 K.W. direct connected generators, with four exciters, of which two are 90 K.W. machines, direct connected to separate wheels, one a 225 K.W. machine, with a separate wheel, and one a 115 K.W., motor-driven generator. To make the plant uniform throughout, the four old generators have been overhauled and changed from two-phase to three-phase. Power is sent to Butte at 50,000 volts and to Helena at 10,000. Among the customers of the power company are mining, smelting, lighting and power companies in Helena, East Helena, Anaconda and Butte, Mont.

Compressed Air for Mine Haulage.

During the last ten years a great many mines have replaced animal haulage with compressed air motors, which lend themselves splendidly to the work desired. There are, in general, two systems—the low pressure system, in which air is compressed to 500 or 600 pounds, and the high pressure system, with air pressure of 2000 pounds and over. The former system can be used in large galleries or tunnels or drifts, where the width is ample and the track is reasonably straight. This permits a large receiver on the motor, 30 to 40 inches in diameter and from 8 to 16 feet long, to be banded with ease. The high pressure system is used where the drifts are narrow or the curves on a small radius, permitting only a small wheel base on the motor. Large receivers are, therefore, impractical, and steel tubes must be used and charged with high pressure air to get sufficient volume.

Compressed air may be used cold on either of these motors, or the air may be passed to small tanks of hot water supplied to the motor at the charging stations.

The air and hot water combination does almost double the work that cold air will do. These motors can carry sufficient air for any ordinary run desired and haul tremendous loads. Two miles and return, with fifteen or twenty loaded cars, is not an extraordinary effort, and from the general results obtained the cost of haulage is from one-half to one-third of the cost of animal power. The air escaping from the exhaust of the motor engine adds to the ventilating effect in the mine, and the whole system harmonizes thoroughly with the power outfit in the average mine.—E. A. Rix in Cassier's Magazine.

The Deep Lake Mines.

State Geologist Lane, who is investigating the temperature of the deep mines of the copper country in the vicinity of Houghton, Mich., has found that the temperature increases 1° in every 160 feet. As a rule, the increase in other deep mines of the world is 1° to every 110 feet. The deepest shafts of the Tamarrack and Calumet & Hecla show a temperature of 86° to 90° above zero. Experiments in deep well borings in lower Michigan give data which would cause a temperature of 130° in these shafts if the rate of increase were so great there. Dr. Lane ascribes the coolness of the lake mines to the great conductivity of the rock strata.

Want Bids on Aerial Tramway.

FORT JONES, SISKIYOU COUNTY, CAL., }
July 22, 1902. }

MINING AND SCIENTIFIC PRESS:

We propose putting in an aerial tramway to haul pine lumber across a divide a distance of from 1½ to 1½ miles.

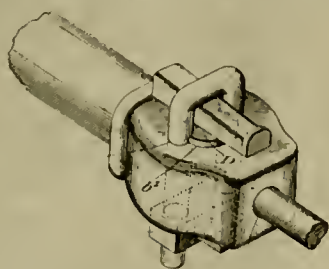
Respectfully,
NORTON & PRATT LUMBER CO.,
P. O. address, Gazelle, Cal.

Mining and Metallurgical Patents.

Patents Issued July 15, 1902.

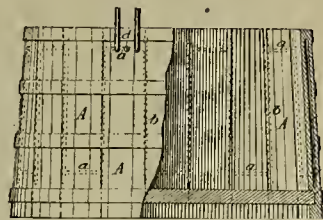
Specially Prepared for the MINING AND SCIENTIFIC PRESS.

DRILL-HOLDING CHUCK BOLT FOR ROCK DRILLS.—No. 704,502; O. H. Bossert, Denver, Colo.



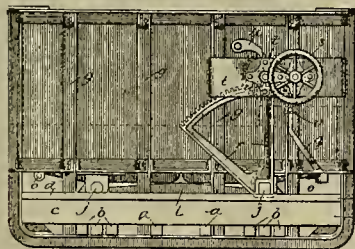
In drill holder for rock drills, combination with drill and drill chuck, of clamp block which fits in recess in chuck, block provided on its under side with semi-circular recess which overlies end of drill; U-shaped bolt, straddling block, members thereof passing through chuck, each member being provided with groove or recess near lower end; yoke having vertical holes and holes at right angles to vertical holes, which intersect same, yoke adapted to fit on depending ends of U-shaped bolt; pins which pass through last-mentioned holes in yoke, and through grooves or recesses in ends of U-shaped bolt so as to lock yoke upon bolt, and wedge which is driven between connecting member of U-shaped bolt and top of clamping block, so as to clamp block upon end of drill, to retain same within chuck.

TANK.—No. 704,539;—E. N. Harmon, Belvedere, Cal.



Tank composed of staves, each having longitudinal edge grooves, and intersecting passage connecting grooves; intersecting passages in adjoining staves being in different planes, all passages and grooves forming, in series, a single continuous waterway; communicating horizontal passages, arranged alternately near top and bottom of adjacent staves.

DUMP CAR.—No. 704,578; E. M. Ray and R. B. McConney, Denver, Colo.



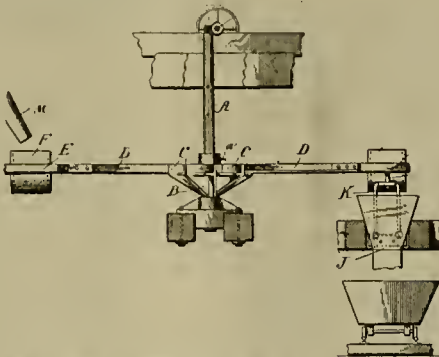
In car of class described, combination of fixed frame portion formed of longitudinal sills and U-shaped transverse metal members which form tie beams for sills and side posts for car, metallic members for tying upper ends of posts together, rock shafts arranged longitudinally of car, one at each side of longitudinal center thereof, dumping hoxes L-shaped in cross-section and substantially U-shaped in longitudinal section secured to rock shafts so that they may be tilted to dumping positions, swinging doors pivotally secured to sides of car frame at or near upper portion thereof with their free edge at or near lower side of car to form closure therefor and for outer side of dumping hoxes, hooked plates provided with rock shafts pivotally secured to outer lateral edge of dumping hoxes adapted to engage with free end of swinging doors and hold same in locked position, lever for operating rock shaft and means for holding it in locked position, means for holding and rocking main rock shafts and thereby tilting dumping hoxes into carrying or dumping positions.

PROCESS OF EXTRACTING COPPER AND NICKEL FROM SULPHIDE COMPOUNDS.—No. 704,640; C. Hoepfner, Frankfort, Germany.

Process consists in oxidizing roasting copper and nickel sulphide ores or mattes, thereby forming sulphurous acid gas and sulphate of copper, dissolving latter and converting it into cupric chloride by means of alkali-metal chloride, converting cupric into cuprous chloride by means of incompletely roasted material and sulphurous acid, thereby dissolving nickel salts from roasted material and leached resi-

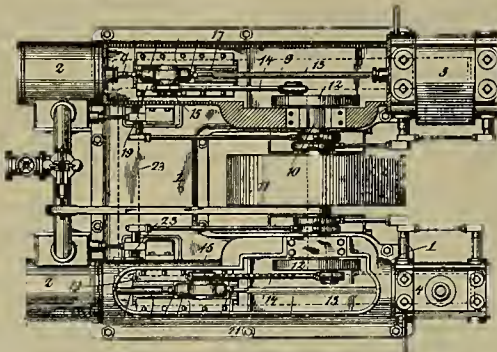
dues, removing cuprous chloride from solution and treating new quantities of ore with resulting solution containing some alkali-metal chloride and cuprous chloride.

ORE SAMPLER.—No. 704,853; S. E. Bretherton, Val Verde, Arizona.



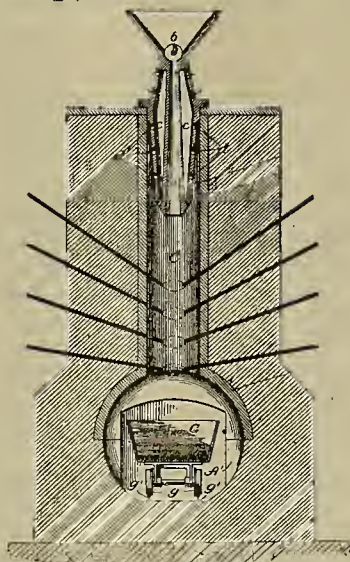
Ore sampler consisting of vertical shaft and means for rotating it, spider adjustable on supporting shaft and having radiating arms detachable therewith as specified, arms carrying at their free ends balanced buckets having projections for engaging fixed tripper device dumping buckets, buckets having stop device permitting it to swing in one direction only beyond its balanced position.

COMPRESSOR.—No. 704,914; F. W. Parsons, Elmira, N. Y., assignor to Rand Drill Co., New York, N. Y.



In fluid compressor, combination with two power cylinders arranged side by side, two compression cylinders also arranged side by side, and each in line with one of power cylinders, pistons for cylinders, sectional piston rods connecting pistons in opposite cylinders, one section of each such piston rods being connected to one piston, the sections of piston rods being separable from each other, crosshead for such piston rod, located between corresponding cylinders, provided with inwardly projecting wrist pin, of crosshead guide for each of crossheads having means for resisting lateral stress upon crosshead, transverse crankshaft, intermediate of cylinders, flywheel thereon, and connecting rod connecting each wrist pin with crankshaft, connecting rods each arranged eccentrically of axis of its corresponding pistons and piston rod, and to have path of movement to one side of path of movement of piston rod.

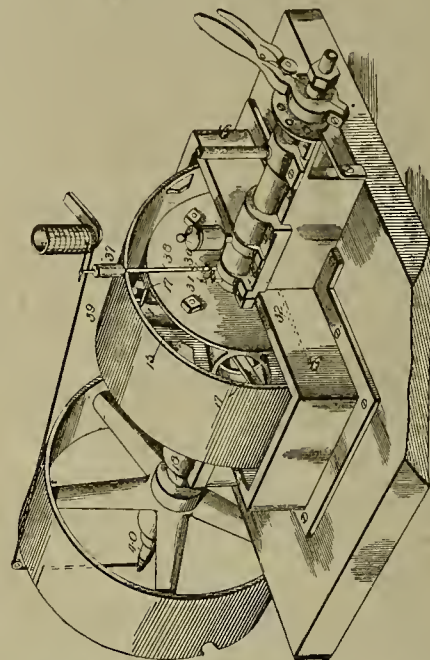
ELECTRIC SMELTING FURNACE.—No. 704,993; F. C. Weber, Chicago, Ill.



In an electric smelting furnace, combination of furnace chamber, several superposed series of electrodes projected laterally into furnace chamber from opposite sides thereof at different planes of inclination, with arcing space between companion electrodes of each series for superposed arcing space to form graded vertical downwardly extended and con-

tinued smelting and arcing space, means for regulating and graduating voltage or temperature of each separate series of electrodes, and feed or delivery spout projected downwardly into furnace chamber in juxtaposition to arcing and smelting space at commencement thereof and having central opening for discharge of material in line with smelting and arcing space for initial subjection of material to heat as it is discharged and final subjection of material in its passage through arcing space.

ROTARY ENGINE.—No. 705,004; W. D. Williams, Fredericksburg, Va.



In multiple engine having ports, one for each engine, valves controlling ports, fixed part having passage adapted to communicate with ports of engines, and an indicator mechanism adapted to be applied to fixed parts.

LEACHING AND EXTRACTION OF METALS FROM THEIR ORES.—No. 704,639; C. Hoepfner, Frankfort, Germany.

Process of treating ores and metallic compounds, which consists in leaching same with warm cupric-chloride solution containing solvent of cuprous chloride in quantity less than is required for saturation, precipitating lead and part of silver chloride formed by refrigeration, reconvert resulting solution into cupric-chloride solution, returning same at higher degree of temperature to material treated, thereby dissolving copper, precipitating any excess of iron by an oxygen compound of copper, electrolyzing solution to recover copper and zinc, returning resulting electrolyte into cycle of operations.

PROCESS OF SEPARATING ALKALI-METAL SULPHATES FROM MIXED SOLUTIONS.—No. 704,036; C. Hoepfner, Frankfort, Germany.

Method of separating alkaline sulphates from mixed solutions, which consists in rapidly cooling same by allowing them to flow into cold solution of chloride while being constantly stirred, using resulting cold solution to reduce temperature of cooling gasses used in refrigerating plant.

Volumetric Copper Determination.

M. F. Repiton, in an article on this subject, recommends the use of potassium ferro-cyanide, instead of potassium cyanide. A N-10 solution is added to a neutral boiling solution of the copper as sulphate, until test drops show up blue with ferrous sulphate. The application of this method to other metals is being investigated by the author, who is continuing his experiments and going into the matter exhaustively. Exact results may also be obtained if a neutral solution of the copper as sulphate, chloride or acetate is precipitated with an excess of a standard solution of oxalic acid. Let this mixture be set aside for three hours, then add a little sulphuric acid and titrate the excess of oxalic acid with a permanganate solution of known relative value, the amount of oxalic acid combined with the copper being calculated by difference. The value of this, in terms of copper, is decided by repeating the process on copper solutions of known strength.

Some Australian Salaries.

In developing the Chillagoe mine Mr. A. Stewart, general manager for three years, drew £10,000 per annum; Mr. Smith, mining manager, three years at £1000 per annum; Mr. Back, managing director, five years at £2500 per annum; Mr. Wienberg, general manager, one year at £4000; five directors, three years at £400 per annum, making a grand total of £58,000.—Gladstone Observer.

Mining Summary.

Specially compiled and reported for the
MINING AND SCIENTIFIC PRESS.

ALASKA.

At the Treadwell mines, on Douglas Island, 2 miles from Juneau, with which the mines are connected by hourly steam ferry service, the first stamp mill was put in in 1885 and gradually increased until now there are 800 stamps in daily operation at the Treadwell mines. One of these stamp mills runs through about 3000 tons of ore daily; the tonnage for May was 89,000 tons.

Four associated companies, under one management, are working the ledge—the Alaska-Treadwell, the Alaska-Mexican, the Juneau-Alaska and the Ready Bullion. Manager J. MacDonald is in immediate charge.

Besides the open quarry work, the property is also opened to a depth of 700 feet, with thousands of feet of crosscutting and drifting. In the quarry, now about 1000 feet long, 400 feet wide and sides each 450 feet high, the ore is broken down by the machines and run through 30-foot raises to the 600-foot level of the mine. From this point it is raised to the surface by means of skips. In the deep workings of the Treadwell a system has been put in operation by which but little timbering is done, and which, it is said, has resulted in a saving of 34 cents per ton in the expense of mining. The ore body at the Treadwell is about 400 feet wide, with well defined walls, but the length and depth of the ore has never yet been determined—it is of such magnitude. The ore is a white quartz and very hard. The values are entirely in gold and not visible to the naked eye.

Five years ago the late Capt. T. Mein made expert report on the Alaska-Treadwell, saying that there were 5,000,000 tons of ore above the 220-foot level, and estimating that it would last 100 feet below that level, which would make 7,000,000 tons. At that time he recommended the adding of stamps to bring the total up to its present number, saying that in that way the cost of mining and milling the ore should not exceed \$1 per ton.

ARIZONA.

The Troy Copper Co. will turn over the property to the Troy-Manhattan Copper Co., recently incorporated under Maine laws. The original Troy Co. was incorporated under West Virginia laws. The exchange will be made on the basis of five shares of new stock for four shares of the old. The consolidation of the Troy and Manhattan companies gives a combined area of 1100 acres, upon which are four mines. The directors have voted to increase the smelter capacity to 250 tons. The enlarged plant will, however, largely turn out matte.

COCHISE COUNTY.

The Hecla & Arizona G. & C. M. Co. has been organized to operate in the Bisbee district. J. M. Carroll, general manager. The company has eleven mining claims on Iron mountain.

General Manager Bagge of the Black Diamond C. M. Co. has the 200-ton smelter ready to be blown in upon the completion of the tramway, which will be ready August 15. The tram is 3 miles in length and has a carrying capacity of 600 tons per day of twenty-four hours.

The Copper Bell mines at Gleason have shut down on account of attachments by Tombstone and Pearce firms.

Eureka M. & M. Co. of Tombstone, O. B. Steen manager, has properties near the line in the Huachuca mountains, across from the Cananea. There are seven claims in the group and there has been 3000 feet of development work done on them. They are pushing work on the 20-ton concentrator. It will be in operation September 1 and concentrate the low-grade ores. The higher grade will be shipped as taken from the mines.

GILA COUNTY.

At Globe the Old Dominion mine in June produced 820,000 pounds of copper. A production of 800,000 pounds per month has been averaged through the year.

R. M. Foree of the Arizona-Colorado C. B. & G. M. Co. has assay of sample of ore from the Baltic: Gold \$39.29, silver 408.10 ounces, copper 9%. The company's properties are 3 miles from Globe. They will sink to water level. At the United Globe the Gray shaft is unwatered.

GRAHAM COUNTY.

C. H. Merrill is Supt. Graham County M. Co., a reorganization of the old Spenazuma M. Co. Twenty-five men will be employed. The property is near Solomonsville. The claims are the Mocking Bird, Fenton and Everett. Schuyler S. Moore is general manager.

MARICOPA COUNTY.

At Phoenix are incorporated the Chicago-Alaskan G. M. Co., by M. E. Parenteau, R. M. Griffith, F. E. Hayner, and the Socorro Mine Co., by S. P. Anderson, D. G. Adams, P. Gray, A. Chapelle of Chicago.

MOHAVE COUNTY.

At the Homestake mine, 3 miles south of Kingman, bigger ore bodies are being opened. The mine will soon be fitted with a milling plant to handle the ore from the property on a large scale. The average of the ore so far opened up is \$8 per ton and the estimated cost of mining and milling \$2 per ton.

The Chloride smelter is being tested preparatory to the contractors turning it over to the company.

The Kingman Miner directs attention to the fact that Mohave county is a producer of copper. The smelter returns of the Grand Gulch mines by Supt. Jennings show that from November, 1899, to date there has been shipped to the smelter 1000 tons of ore, the average of which was 44% copper, 5 ounces silver and \$1 gold. For this nearly \$100,000 was received from the smelter. The wagon haul from the mine to the railroad is 180 miles, for which haulage \$23 per ton is paid. Railroad freight amounts to \$6 per ton, a total haulage charge of \$29.

SANTA CRUZ COUNTY.

In the Apache Chief mine, Tyndall district, Santa Rita mountains, the shaft has water at a depth of 348 feet, developing at the same time a body of ore.

YAVAPAI COUNTY.

Manager E. W. Platt, Illizona M. Co., has two shifts drifting on the 100-foot level. He intends putting in two power drills, to be run by gasoline. His address is Kirkland.

The board of equalization of Yavapai county has raised the assessment of the United Verde Copper Co. of Jerome from \$625,000 to \$1,200,000.

The Carrigan group, near Congress, is being worked by the Senate Co., O. F. Woodward, C. N. Kenney, S. H. Hooker and C. A. Akers. The property was bought March 12, 1902. A depth of 300 feet has been made and 400 feet of drifting done. At the 120-foot level and at the 220-foot level drifts have been run. As soon as the 320-foot level is reached the present force of twenty-five men will be increased to seventy-one.

CALIFORNIA.

AMADOR COUNTY.

The 20-stamp mill and surface works of the Wheeler mine, near Plymouth, were totally destroyed by fire on the 18th inst. The property was owned by the Western Penn. M. Co., and was not in operation.

Thirty stamps are in operation at the Wildman mine, near Jackson.

The Standard Electric Co. has begun the survey for the new power line from its plant at Electra to Sutter Creek.

BUTTE COUNTY.

The Kaiora M. & M. Co. has incorporated; principal place of business, Phoenix, Ariz.; E. K. Wood, D. M. Tomblin, J. E. Spencer.

CALAVERAS COUNTY.

(Special Correspondence).—Increased interest has been added to the present favorable outlook for deep mining at Angels through the prospects obtained by the Oriole M. Co. in sinking on the Thunderbolt mine, near old camp Los Muertos. Their shaft is now down 630 feet, and 250 feet south from which, in the 500-foot level, the company have ore on the vein 6 feet wide. Returns from the samples taken have not yet been had owing to pressure of work in the local assay office. In the north drift on the same level at 400 feet from the shaft they have a body of low-grade ore. These prospects indicate another addition to the list of deep paying mines in that vicinity.

The Ghost mine, which has been pumping now about two weeks, has the main shaft about free from water, and the Drake Co. will soon recommence underground work.

The Last Chance, a parallel vein thereto, is now working twenty-five men, with good prospects. This is the property recently bonded to Salt Lake people through Messrs. Street & Higgins.

Angels, July 22.

A new hoist goes on the Fannie Marie mine at Glencoe. Supt. C. H. Blake will have a 10-stamp mill in operation in September.

Near San Andreas, at the Watcher mine, a hoist is being erected and an incline shaft run.

In the vicinity of Angels, at the Last Chance, men are sinking and arrangements are being made for a hoist capable of 2000 feet.—At the Melones sixty stamps are in operation. The new 8-ton electric engine will haul eight 6-ton ore cars from the tunnel to the ore bin, 2200

feet.—A new 25-stamp mill at the Oriole is projected.—The shaft at the Sultana mine is down 600 feet.—The Altaville shaft is down 423 feet. This shaft, including engine, hoiler, hoist, gallows-frame, timbering and labor, has been put down at an average cost of \$23.20 per foot; it is a two-compartment and manway shaft.—At the Benson mine sinking is going on. A hoist capable of sinking 1000 feet is up.

DEL NORTE COUNTY.

M. E. Horr has been examining the properties owned by the Elkhorn M. Co., sixteen claims 80 miles south of Grant's Pass, it being necessary to take the stage from that point to within 3 miles of the property, and to cover the remaining distance by trail. The placer ground is formed by a basin, walled in by the mountains, and the black sand in the cavity showing with flake gold.

KERN COUNTY.

The Miner says men are stringing wires between Garlock and the Mammoth Coal Co.'s mine; a 30 H. P. dynamo is on the ground. The Mexican miners have been discharged and places taken by Americans. The shaft is down 140 feet; drifting on a 12° rise.

The Yellow Aster M. Co., Randsburg, has borrowed \$100,000, securing the payment thereof by a mortgage of some of the property, payable in one year.

The Boston & Kern River M. Co. has incorporated; principal place of business, Portland, Me.; T. W. Pack, B. E. Kemp, G. M. Barney, H. M. Verrill.

LOS ANGELES COUNTY.

The La Crescenta M. Co. has incorporated in Los Angeles; W. Haerle, P. Walters, B. W. Lee, G. W. Eddy, A. R. Young.

MARIPOSA COUNTY.

The Hite Cove mine has been bought by San Francisco men, who will operate it. F. W. Krogh, of the Krogh Manufacturing Co. of San Francisco, is interested in the property.

MONO COUNTY.

At Lundy Manager Pierce in the new tunnel of the Crystal Lake M. Co. is reported to have 4 feet of paying ore 1808 feet from the mouth of the tunnel.

In the Standard Con. mine at Bodie, for the week ending July 12th, 437 tons of ore were crushed; average assay vanner tailings, \$7.04; concentrates produced, 1.40 ton; assay value, \$112.35; amalgam produced, 2048 ounces; assay value, \$2.67 per ounce.

NEVADA COUNTY.

By Sept. 1 it is expected that the new 20-stamp mill at Allison Ranch will be ready.

The old chlorination plant at the Delhi mine has been repaired and about 5000 tons of sulphurets on the dumps will be worked by the Pioneer Reduction Works of Nevada City.

Nevada county will have a fine mineral display at the Ferry Building, San Francisco, during the Pythian festivities next month. Chairman Dunlap states that arrangements are completed for a \$250,000 gold brick from the Selby Smelting Works.

F. DuLmaine is Supt. the Normandie mine at Deadman's Flat. Men are removing the steam hoist and pumping plant from the Diamond property for the Normandie.

The Bay Counties Co.'s property in the Nevada county division is reported in fine condition. A new stone sub-station has been completed which supplies power to operate the Nevada County Traction Co.'s electric railroad. The Colgate power house has been practically completed. The Yuba power house has been in operation under almost a constant full load and has shown great capacity. The demand for electric power to operate gold dredgers at Oroville has increased.

Grass Valley reports the finding of a pocket by J. & R. Gassaway, worth over \$7000, at Deadman's Flat.

PLACER COUNTY.

The Colfax Sentinel says W. R. Russell of Boston is at the head of the company which bought 7 miles of channel below Forest Hill. The tunnel to work the property is being run at Peckham Hill, 1100 feet below the level of the town of Forest Hill. Fifteen men are employed. Suitable machinery will be put in.

The Bonnie Bee Q. M. Co. of Dutch Flat, H. A. Frost secretary, will put a 10-stamp mill on its property.

SAN FRANCISCO COUNTY.

The Mt. Boliva G. M. & M. Co. has incorporated in San Francisco; F. D. Hopkins, F. J. Cardozo, R. E. Leif, L. J. Charlevella, H. P. Griffith, G. W. Toohy.

SAN DIEGO COUNTY.

The Julian Con. M. Co. and the Owens mine, including the Helvetia and High Peak, are bonded to Eastern men.

SAN LUIS OBISPO COUNTY.

The Madrone Quicksilver Co. is incorporated in Los Angeles to work properties 16 miles from Cayucos. A ten-pipe retort is put in and the mine is paying its way. In the tunnel 200 feet of work has been done. The cinnabar ore is found in the serpentine rock. The average is 24%. The company will place an order for a twenty-ton furnace. There was shipped from the mine last week twenty-one flasks of quicksilver, the result of two months' work.

SHASTA COUNTY.

The Redding Searchlight says "209 mining claims on Pit river have been transferred to the Electric Iron & Steel Co. of San Francisco by Esterle, Smyth, Bruson and Hall."

Three ore trains are running between the Iron Mountain mine and Keswick smelter.

E. W. Hayden at Redding says he has a bond on the 400 acres comprising the Dakin tract for a company composed of San Francisco and New York people. The terms of the bond required that two dredgers be operated within ninety days. Prospect drills will be put to work.

In Old Diggings the Central gold mine, A. A. Anthony Supt., has an upraise from the tunnel 210 feet to the surface, making good ventilation. The upraise shows good ore nearly all the way up.

Three years labor, involving an expenditure of \$12,000 in the Evening Star mine, owned by Panter & Litsch, has been put on a 1400-foot tunnel to tap the ledge.

H. C. Woodrow has resumed work at the Texas mine.

The Shasta May Blossom C. M. & S. Co. has incorporated; principal place of business, Phoenix, Ariz.; M. B. and M. Lindley, L. A. Booth.

T. F. Lawson, a copper share promoter of Boston who brought out the Trinity Co., says: "In all probability on the first day of next January the price of copper will be established the world over at 15½ cents, established in a way that will be self-evident to all, producer as well as consumer, and the public, that it is established legitimately and for all time, and that the stocks representing good copper mines are to be made conservative, legitimate investments upon a permanent basis of 6%, 5% and finally 4% net returns, which will enable more than the doubling of the present market price of the copper stocks."

The Mountain Copper Co. want their tax assessment reduced from \$1,535,215 to \$734,215, but the county board declined to make the reduction.

During the hearing the information was elicited that the drop of 4 cents in the price of copper had deprived the corporation of two-thirds of its net profits; and if the company desired to sell its holdings at the present time, a better price than \$734,215 could hardly be obtained. In the past five years the Mountain Copper Co. had earned \$5,416,000 on an original investment of \$6,250,000. The annual net earnings of the company were as follows:

1901	.....	\$1,716,000
1900	.....	1,300,000
1899	.....	1,500,000
1898	.....	600,000
1897	.....	300,000

Total.....\$5,416,000

During 1901 the price of copper was about 16 cents per pound, and under those favorable circumstances a net profit of \$1,716,000 was realized. Manager Wright's estimate of the profits to accrue during the current year, with copper at 12 cents per pound, was \$610,000. The depreciation of copper was not the only loss to the company from the year 1901, as fire in the mine had rendered inaccessible large bodies of ore. The amount of ore blocked out and actually accessible in the mine on March 1, 1902, was given at 538,635 tons, which, at an estimated value of \$2.65 net per ton, would give a value of \$1,587,382 to the immediate ore supply. Against this sum Manager Wright charged the cost of the present equipment of the company, which the statements showed was \$977,784, leaving a net reserve ore supply valued at \$549,598, upon which he had based his estimate of \$332,000 for the reserve supply of ore, after deducting a certain percentage for possibility of loss or depreciation in values from the estimated values by reason of the fire. The property was bought in 1895 and the reduction of the ores begun January 1, 1897. Two failures had resulted before a satisfactory method of reduction had been discovered. The legal representative of the company referred to the assessment of the Bully Hill M. & S. Co. as something over \$448,000. He said it was stated that the De Lamar property is or was earning from \$100,000 to \$150,000 a month. They were producing bullion said to be worth \$1 a pound.

SIERRA COUNTY.

Supt. E. Squier at the Tabor mine, near Gibsonville, has 3000 feet of the tunnel in and has pierced the rim of the channel and struck pipe clay, with the bedrock still pitching. He will run the tunnel 100 feet farther and then sink to bedrock.

SISKIYOU COUNTY.

The Yreka Journal hears of the organizing of a company to reopen the Greenhorn blue gravel mine, which has been a good paying property.—Supt. Cook of the Punch Creek mine at Humburg has ore paying \$16 a ton, with a 2-foot ledge. His mill is running constantly.—Hydraulic mining at Humburg bar, Sciad and other points on the lower Klamath, is suspended in most of the claims, the water giving out.—The Quartz Valley hydraulic mines are still running, with a good supply of water to keep the giants and hydraulic elevators in constant operation. Supt. Brokaw expects the supply to last several weeks longer.—At Etna the Ball mine is closed owing to lack of water. There will probably be improvements made, to be ready for the fall run.

SOLANO COUNTY.

At Mare Island, the Atlantic, Gulf & Pacific Co., New York and San Francisco, submitted the lowest bid at 17 74 cents a cubic yard for 100,000 cubic yards of dredging at the navy yard. The West Coast Dredging Co., San Francisco, submitted the only other bid, 18.69 cents a cubic yard.

SONOMA COUNTY.

The Sonoma Con. Co. has incorporated; principal place of business, Santa Rosa; C. Winters, S. S. Bogle, F. H. Newman, L. V. Hitchcock, E. C. Barham.

TRINITY COUNTY.

G. L. Carr has fifteen men on the Yellow Rose of Texas.—The Golden Jubilee shows a new 6-foot ledge of ore that averages \$20.—In the Dorleska mine a 3-foot ledge of high-grade ore has been struck in the lower tunnel.—Two giants are at work on the Nash mine, the property of the Trinity G. P. M. Syndicate.—The Strode mine has fifteen men at work.—Meade Bros. mill, 7 miles above Carrville, is in operation.

F. P. Burris is acting Supt. Valencia C. M. Co., east fork of New River. The company owns some copper claims in the New River section. C. S. Laumeister of San Francisco is president. It is the intention to develop.

TUOLUMNE COUNTY.

The Sonora Banner says the Eagle Shawmut ledge in the workings is 160 feet wide. No waste is run out of the mine, abandoned workings being filled in. At the new hoist on the Eagle the pipe line delivers water at a pressure of 550 feet. At the new mill the pressure is 950 feet. The cost of running approximates \$30,000 per month, the wage account being \$17,000 for 250 men. A stone dam is contemplated to dredge the creek bed, deepening the channel and making it easy to sluice out the tallings. It is stated as a fact that ores are worked by this company at 75 cents per ton.

The Republican mine shaft will be sunk 600 feet and ten more stamps added to the mill.

The Hunter mine is bonded by San Francisco men from C. A. Holland for \$15,000, \$3000 payable in four months, \$6000 in nine, the remainder in twelve months. Ten miners will be put on. C. Sweeney has charge of operations.

The Hazel Dell mine on the Stanislaus river, 15 miles north of Carters, is working twenty men. Supt. Cope is sinking for the 300 foot and stopping out from the 200 level.

C. A. Smith has started up the Sunnyside mine. A roller mill will be put up immediately and a tramway 1700 feet long built from the top of the hill to the river.

The Sullivan mine near Soulsbyville is being reopened.

YUBA COUNTY.

A Marysville report is to the effect that the building of the four restraining barriers across Yuba river, near that city, is not the only undertaking which the California Debris Commission is looking after in that section. Statement is made that the Commission proposes to straighten the channel of the river between De Guerre Point and Marysville.

The Pennsylvania and Jefferson mines, Browns Valley, bond expires August 7th. An effort is being made to secure additional capital. About \$50,000 has been expended by the present company.

On the Yuba river, 10 miles above Marysville, prospecting is now being carried on by means of four Keystone drilling machines under the direction of W. P. Hammon. Seventy men are employed. Four improved dredgers, averaging in cost \$75,000 each, are taken of in connection with extensive dredging work in that vicinity.

COLORADO.

Colorado has appropriated \$50,000 for its State building at the St. Louis World's Fair and will raise \$250,000 more by municipal taxation. The assessment is for two-fifths of a mill upon every dollar's valuation in the State. The building will be constructed principally of yellow onyx and mottled marble. Every article embodied in its erection will be of local production, down to nails and glass. It will take an entire train to transport the materials and things which will be shown in the exhibition halls. The structure, approximately, will be 150x75 feet in dimensions, and two stories in height. Work will be commenced upon the assignment of the area. The State structure will be a colossal lounging place, superbly appointed and finished in onyx and marble. The mineral exhibits will consist of gold, silver, copper, lead and iron. Probably the most interesting exhibition planned by the commission is a miniature mine, to be operated. If the exposition company's consent can be secured, a 150-foot shaft will be sunk.

BOULDER COUNTY.

Wall Street reports the sale of the Black Cloud and Gold Hill group of mines to Boston men by B. F. Langridge for \$100,000. The group consists of seventeen mines and prospects, all passing to the Corona M. Co., organized under the laws of the State of Maine. The group has about 4000 feet of development work. A tunnel 700 feet long will be run to cut the Gold Hill property. A new mill will be put in.

Near Boulder Eastern stockholders in the Corona M. Co. have planned a large concentration and reduction mill to treat the low grade ores.—The Nancy G. M. & M. Co. at Wall Street is shipping regularly from the Gillard & Grey copper veins. The main tunnel is in 1600 feet.

CHAFFEE COUNTY.

At Turret the Anaconda mine, owned by the Bancroft M. Co., shows a vein of good ore in sinking. The new smelter will be running September 1. The Independence mine has begun the delivery of a 200-ton lot to the smelter.

CLEAR CREEK COUNTY.

The properties and interests of the Con. Stanley M. Co. and the Sallsbury M. & M. Co. are consolidated under the name of the Stanley Con. M. & M. Co. The new company controls 100 acres in the Idaho Springs district. The mines have 5 miles of underground workings.

At Yankee a rich strike has been made in the Lombard mine, belonging to the Yankee Con. M. & T. Co., in the second level of the mine, in the stope. The vein is 11 feet wide, of which 6 feet is smelting ore. The remainder is mill ore, worth about \$20 per ton. H. I. Seaman is general manager.

GILPIN COUNTY.

Russell and Lake districts are shipping large quantities and values, and great interest is shown in properties in that section. The Pittsburg group of mines, Lake district, are being operated by the Cashier G. M. & R. Co., under the management of B. L. Campbell. Seventy men are employed, the average monthly output of the mines is 750 tons of mill ore and 100 tons of smelting ore. The mill ore carries from two to ten ounces gold to the cord; the smelting ores have an average value of \$100 per ton.

GUNNISON COUNTY.

Gunnison reports that the East River G. M. & M. Co. will operate its property in the Gothic district extensively this season. The company owns six claims, on which has been done 1200 feet of development work. One tunnel is 500 feet in length. The vein, 3 feet in width, runs twenty-five ounces silver and \$5 gold.

Gunnison reports likelihood of the building of the Taylor Park railway, grading to begin next month. The proposed route will cover 50 miles, linking Buena Vista and Aspen. The Taylor Park Railway Co. is interesting in mining in that part of Gunnison county through the Taylor Park M. Co.

The Forest Hill Con. M. Co. has the main shaft down 400 feet. The company has a concentrating mill in operation 2 miles from the mine.

HINSDALE COUNTY.

Near Lake City, Supt. H. W. Brown of the Hanna G. M. Co. has the concentrating mill completed. The completion of the tramway is scheduled for Aug. 1.

LAKE COUNTY.

At Leadville, D. H. Moffat, owner Louisville mine, has sold it to E. A. Hanf and W. O. Reynolds, two local miners. Progress is being made at the Yak tunnel, 10 feet a day.

At Leadville, the A. M. W. is treating its slimes. A spur from the D. & R. G. runs to the mill, and along the tracks are mine ore bins, each with a capacity of seventy tons. Two sluice boxes carry

streams of water laden with zinc or lead concentrates. The water passes out of the bins through fine screens, and is caught in settling tanks. The material is loaded on the cars at the bins and it is not transferred until it reaches Galveston.

The Keystone M. Co. has secured sufficient money to pay off all its indebtedness and will resume operations.

At Leadville the Printer Boy M. Co. is locally reported to have opened up a vein of ore that will run \$500 to the ton.

The News-Dispatch reports a placer mining proposition on the Hayden ranch by men who have floated a steam dredger and steel rail track into the river bed of the Arkansas, cutting out a 2-foot road with a steam shovel, swinging it around and dumping it into a sluice box. The values are taken out by a set of rifles; the dredger will work in a 10-foot breast and on bedrock. This work, now in 2 feet of gravel, is paying expenses. The company has a large tract to work and is moving towards Leadville.

The Home Extension M. Co. will buy the Morocco M. Co. Manager Schlessenger, who it is understood will be the manager for the Home Extension M. Co., says that, if a market was open for the sale of manganese ore, the Morocco M. Co. could be put on a paying basis at once and begin shipping. As the market stands now, with no demand for manganese ore, he thought that \$30,000 would be sufficient to put the Home Extension on a paying basis by working through the Morocco shaft.

MINERAL COUNTY.

(Special Correspondence).—The Delmonte Leasing Co. here are operating the Delmonte, Last Chance and Volunteer mines on Bachelor mountain and are now shipping about seventy tons per day. J. W. Westlake is the superintendent, who also has charge of the New York mine, operated by the New York Leasing Co. The ore is mostly siliceous, averaging fifty ounces in silver. They expect to raise the tonnage to 100 tons per day next month. Considerable development work is being done on the New York, running three levels south towards the Commodore line. Mr. Westlake also has charge of the Big Kanawha Co., operating the old Happy Thought mine. They are sending sixty tons per day to the mill and expect in a short time to ship about thirty tons per day of their crude ores to the smelters at Pueblo. They employ about thirty-five men on the Big Kanawha and about fifty men on the balance of the properties.

The Amethyst M. Co. here are taking out 250 tons of \$18 to \$20 ore per month. They have been repairing their shaft the past six months, which accounts for the small tonnage. The Humphrey tunnel has cut through and connection made with the Amethyst, and it may be that the ore will be handled through the tunnel instead of by team as they have been doing since the burning of their tramway building in upper Creede about a month ago. Cyrus Miller is superintendent of the Amethyst.

The Ridge mine and mill at Creede have recently been leased by Mosher, Coulson, Carr & Eichbaum. They intend doing a great deal of development work on the mine, driving a raise of 150 feet.

They have the ore bin full of ore and are running the mill one shift. They expect to put on another shift in about a week.

The Ethel mill, J. A. Smith, Supt., is running steady one shift at present, but will run another shift in about ten days. They shipped 225 tons of concentrates last month. Zinc runs 60% and lead 75%. Creede, July 20.

PARK COUNTY.

The Queen City placer has been sold. It is 3 miles southwest of Fairplay on Four-Mile creek. The purchasers are Topeka, Kansas, men, who, after investigation, paid \$80,000 for it. The property consists of over 1000 acres, and as tested shows an average value of 50 cents per cubic yard. The owners say they will put on the best modern appliances for gravel washing and gold recovery. J. B. Adams, of Denver, is still in charge.

RIO GRANDE COUNTY.

(Special Correspondence).—B. F. Herr, Jasper, is putting up a large mill for the treatment of ores in that district. Mr. Oliver is also erecting a mill, and if these two mills prove successful there would be another one put up in the district, as they have a very large amount of low-grade ores and all they need is some kind of process to treat the ores successfully. The Oliver people have about fifty men doing development work on their property. The ore runs \$5 to \$6 per ton. It is understood Mr. Herr is putting in the Gage process for treating the ore. Jasper, July 19.

SAN JUAN COUNTY.

(Special Correspondence).—The Sioux

M. Co., E. C. Condit manager, is pushing work on the property. They were unfortunate last spring in losing their power plant by fire, but will soon be in working order again.

The Sunnyside mine, J. L. Terry manager, Eureka, is enlarging its mill from twenty to forty stamps, and will put in several concentrators. The mill is now daily handling seventy-five tons. The improvements are being made in Sunnyside mill No. 2. Development work is being pushed in the mine.

Eureka, July 17.

(Special Correspondence).—J. B. Warner, general manager Ledge M. & M. Co., Red Mountain, has the foundation completed for his 200-ton concentrating mill at Chattanooga, on Mineral creek, and work on the mill will be pushed as rapidly as possible. He is doing considerable development work on the mine and taking out ore running \$13 to the ton. The ore carries equal values in gold, silver and lead.

Red Mountain, July 17.

(Special Correspondence).—The Hercules Con. M. Co., operating on Sultan mountain, have bodies of ore. The lower tunnel, known as the Empire, is in 2400 feet; the Montezuma tunnel, 208 feet above the Empire, is now in 1800 feet; the Ricker or upper tunnel, 280 feet above the Montezuma, is in 800 feet. They are doing a great deal of development work, and are also operating the Little Dora mill, which was closed down last fall on account of scarcity of water. The mill is handling sixty tons per day. They have been running on the old dumps with the ore they are taking out of the mine. On account of the nature of the ore, they are able to get a very low treatment charge at the smelter. As soon as they can get enough ore blocked out, they will commence to operate the mill to its full capacity. H. V. Snow is secretary and acting manager.

The Silverton M. Co., J. C. O'Neill manager, Silverton, operating the North Star group on Sultan mountain, are making extensive improvements on their mill and power plant. They now have 120 H. P. water power, but are putting in a 300 H. P. steam plant. The engine and power house is to be 80x60 feet and the extension to the mill 75x40 feet. They expect to have the mill in operation by October 1st. They are doing a lot of development work in the different levels in the mine. The lower tunnel cuts the vein 700 feet deep. Their shaft is 110 feet below the level of Mineral creek. They expect to keep on sinking the shaft and opening up the different properties belonging to the company. Ore runs 3 ounces gold, 10 ounces silver, 10% copper. R. J. McCartney is Supt.

Silverton, July 18.

(Special Correspondence).—The Kendrick-Gelder Smelting Co., Silverton, have started up their smelter and handle 150 tons of ore per day. The majority of the ore comes from Red Mountain. They have made a number of improvements and are enabled to handle the ore through the furnaces much faster than heretofore. Manager F. C. Kendrick states they have 5000 tons on hand and getting all the ore they can handle.

The Henrietta mine, owned and operated by the Kendrick-Gelder Co., Silverton, is doing mostly development work at present. They have the lower tunnel in 1400 feet and expect to cut the main ore shoot at 1600 feet at a depth of 400 feet below the lowest workings.

The Esmeralda mine in Minnie gulch, Silverton, R. W. Hollis manager, is shipping sixty tons of ore per week which averages about \$60 to the ton.

The Gold King Con. M. Co., at Gladstone, is operating their 80-stamp mill night and day, handling 200 tons every twenty-four hours. About 160 men are employed by the mine and mill. The ore will average about \$10 per ton, about 25% free milling ore. They have cut the lead at 500 feet below the deepest workings and have the same general character of ore as above, but of a higher grade apparently. Total depth 1100 feet. It is rumored that the Gold King has made a rich strike and uncovered a large body of high-grade ore, but was unable to get Manager W. Z. Kinney to confirm the report.

The Royal M. & I. Co., Silverton, working the King mine on Sultan mountain, have their lower tunnel in 600 feet and expect to cut the vein in 300 feet more at a depth of 800 feet. At a depth of 248 feet they have the vein in the third level. They will build a 1500-foot tramway from the railroad to the upper terminal. Ore is a gray copper and lead, carrying gold, silver and lead. Eastern stockholders have been here the past week and are well pleased with the work being done by Manager M. H. Kinney and Supt. W. R. Pyke.

The Contention M. Co., operating the North Star group on King Solomon mountain, are taking out 100 tons per day.

Ninety-five men are employed. This mine probably has the distinction of being at the highest elevation of any mine in the country, the main hoarding house being a trifle over 13,000 feet above sea level. The tramway from the mill to the mine is 11,000 feet long.

Silverton, July 20.

At Silverton the 200-ton smelter of the Kendrick-Gelder Co. was blown in last week. Thirty men are working at the mine and twenty at the smelter.

SAN MIGUEL COUNTY.

Telluride reports the closing of the Peck cyanide plant, the result of the sale of the ground over which the tailings run from the mines in Savage and Marshall basins, to the mining company operating above the plant. The Peck Co. will go to Mexico.

Another statement regarding this matter from Telluride is that the Peck cyanide plant has been bought by the Tom Boy, Smuggler-Union and Liberty Bell; that these companies have bought the surrounding land as a common dumping ground on which to store their tailings; and that the mines will now treat them on company accounts.

The Big Six group of mines, adjoining the Tom Boy group, has been bonded and leased to M. C. Fulton of Ouray for \$25,000.

At Telluride the Double Eagle M. Co., recently incorporated, will develop and operate mines in Bridal Veil basin. The ore is tellurium and strictly a gold proposition, except the Black Diamond, which carries silver values. The character of this ore is petzite. Samples sent to the smelters for tests gave returns of \$70 per ton gold.

SUMMIT COUNTY.

At Robinson the smelter has closed down for thirty days to extend the smoke-stack.

TELLER COUNTY.

The Keystone M. & M. Co. is considering the sale of the Victoria and Nancy Hanks claims to Eastern parties for \$25,000. The claims comprise 3.18 acres on Bull hill. They have never produced anything and are undeveloped.

The Big Twenty G. M. Co., owning 125 acres on Grouse mountain, have begun a tunnel which when completed will be a mile long.

Cripple Creek reports that the lessees on the Anaconda number forty; sixteen of them are shipping 800 tons a month that averages \$15 per ton. The company receives 25% straight royalties.

The mining inspector has ordered work suspended on the Metallic tunnel, being driven into Rhyolite mountain. There are buildings at the mouth of the tunnel, and, should they catch fire, there might be a parallel case to that of the Smuggler-Union at Telluride, though as the Metallic has no connection with other workings such contingency is unlikely.

In six months the Portland will install the largest compressor in the State with power sufficient to drive forty-five machine drills. The foundation will be a solid wall, 9 feet deep, 20 feet wide, 45 feet long. Foundations are also being made for five hoilers, each 250 H. P.

Final payment of \$200,000 has been made on the Granite mine, Victor, by Tutt, Penrose & MacNeill, officers of the United States Reduction Co. The property consists of the Granite and the Baby Mine claims, ten acres on Battle mountain. The present daily output from the mine is forty-five tons.

Manager A. May of the Last Stake M. & L. Co., operating the Last Stake claim of the American Con. Co., Victor, will let a contract to sink the present shaft to a depth of 1000 feet. It will cost about \$20,000.

The Pharmacist Con. M. Co. has decided that in the future no work will be done on company account. The Pharmacist claim on Bull hill is all being worked by lessees. Some of the lessees are in good ore and are shipping.

IDAHO.

ADA COUNTY.

J. M. Ingalls, manager Ingalls property, Charlotte gulch, will erect a 100-ton Bryan mill on his property.

Work is resumed on the Twin Sisters group of quartz claims in the Boise Basin country. Supt. Ingalls has charge of the work. It is understood that the Trade Dollar Co. is furnishing the funds to carry on the development. There is a shaft down 300 feet and a 10-stamp mill.

BOISE COUNTY.

Manager Hodson of the Lincoln mine, at Pearl, is making tests to determine the kind of machinery needed. The Checkmate, at Pearl, has a stamp mill in operation. The Lincoln Co.'s ore is of a character that a Chilean mill might be of better service. As soon as it is determined whether the rolls or stamps will be used, Manager Hodson will place an order for a large mill.

CUSTER COUNTY.

The White Knob copper mine at Mackay, which closed down unexpectedly a short time ago, throwing several hundred men out of employment, will resume operations next week. General Manager Boyd says that the death of John W. Mackay, the principal owner of the mine, would in no way interfere with the intention to resume work on a large scale. A picture of this property, the last mining property with which the late John W. Mackay was associated, will appear in next week's issue.

ELMORE COUNTY.

Near Mountain Home J. Carty, one of the owners of the Bonaparte mine, says the property is a producer and he will begin working it September 1.

IDAHO COUNTY.

Jno. McMahon of San Francisco declares that he has found cinnabar at Thunder Mountain, 12 miles southwest of the Dewey mine, and tells of finding "gold that ran from 20% to 40% quicksilver," a natural amalgam, as it were. So far nothing in the way of precious metal remains undiscovered in that region as reported locally.

The litigation involving title to the Buffalo Hump group of mines has been settled out of court. Three years ago the Buffalo Hump M. Co. bought the group, the price being announced at \$750,000. Later the claims were jumped. The Buffalo Hump Co. now obtains full title to the group.

ONEIDA COUNTY.

Supt. G. M. Corns of the United Mines Co., Rock creek, near Malad; has the inclined shaft 85 feet in ore averaging \$20 per ton.

OWYHEE COUNTY.

Silver City reports considerable activity, new locations are being made on War Eagle, the rich vein at the Poorman is even better than at first reported, the Sinkertunnel ledge is widening in rich ore and other properties are being operated at a profit.

SHOSHONE COUNTY.

Operations may be resumed by the Frisco Con. M. Co., near Gem. When the mine closed down last year it was shipping 1800 tons a month and employing 300 men.

Following is the assessment of the producing mines of the county for 1901 and 1902, and the increased assessment this year over last:

	1901.	1902.	Increase.
Bunker Hill & Sullivan...	\$156,542	\$658,680	\$502,138
Cœur d'Alene Dev. Co.	6,500	108,150	101,650
Cœur d'Alene M. Co.	19,200	66,200	47,000
Empire State-Idaho M. & M. Co.	181,785	1,168,340	986,555
Helena-Frisco Con.	134,975	615,090	480,115
Golden Chest M. Co.	17,650	111,425	93,725
Gold Hunter M. Co.	23,250	223,000	190,750
Hercules		50,808	
Hecla M. Co.	20,605	313,260	292,655
Morning Mine (Larson & Greenough)	170,020	669,370	499,350
Mammoth M. Co.	50,000	551,200	501,200
Standard M. Co.	116,480	608,350	491,870

Total increase of mining assessments on the mines given over assessment of 1901, including the Hercules, \$4,136,008.

At the Snowstorm, near Mullan, the new tunnel is in 75 feet and shows dry sulphide copper.

At Burke the Hercules will run a new tunnel to cut its ore body 500 feet deeper than the present workings. It will be 2300 feet in length. An air compressor will be put in.

MISSOURI.

JASPER COUNTY.

Joplin reports the output of zinc for the week ended July 12 as amounting to 9,606,420 pounds, valued at \$162,437, and lead 1,352,190 pounds, valued at \$32,453. The output for the last twenty-eight weeks was: Zinc, 291,813,680 pounds, valued at \$4,205,184; lead, 34,252,200 pounds, valued at \$742,912.

MONTANA.

FERGUS COUNTY.

C. T. Durrell, manager Central Montana M. Co., will work the low-grade ore of the Spotted Horse and Whisky Gulch mines.

Fire destroyed the Spotted Horse stamp mill near Maiden last week. The mill was built by Holter & Hauser in 1890 and cost \$100,000. It was not in operation.

FLATHEAD COUNTY.

The Snowshoe mine, in the silver-lead

district southwest of Libby, has resumed operations. Two carloads of concentrates are shipped from Libby each week. Eighty men are employed. As soon as the mine is opened up to the 500-foot level new machinery will be put in and the force increased. On this same belt other mines are being opened up that will become producers. In all about 500 men are working in and about Libby. One can see that it is a place of considerable promise.

GRANITE COUNTY.

King & Murray will begin work on the Antelope mine, near Phillipsburg.

Snyder & Huffman, South Boulder, have a 14-inch streak of free-milling ore that goes nearly \$100 to the ton, and propose building a mill.

J. Schneider projects putting machinery on the Dorothy mine, at Boulder.

A gold nugget weighing \$75 was recently found on Willow creek. It contains some quartz. It was found in the tailings and had evidently been thrown out of a sluice box along with the boulders.

JEFFERSON COUNTY.

The Elkhorn mine will employ 150 men and is adding to its force as fast as miners can be secured.

LEWIS AND CLARKE COUNTY.

In the East Helena smelting plant one of the blast furnaces has been blown and the calcining furnaces have been in use a week. The entire plant will be in operation this week. It is locally understood that E. B. Braden will have charge and that C. W. Whitley, who has been in charge, will take the chief position in the Salt Lake City works.

An express carload of cyanide product worth over \$30,000 has been shipped from the Drumlummon cyanide plant at Marysville to an Eastern refinery. The cyanide plant of the Drumlummon has a capacity of 400 tons of tailings per day. The plant is on Silver creek, 16 miles from Helena. It is treating the tailings from the Drumlummon mine, the accumulation of the long milling operations of the company and fill the bed of Silver creek for 5 or 6 miles below the 110-stamp mill belonging to the company at Marysville.

A method of precipitating gold and base metals in the cyanide solution without the use of zinc is employed at the Empire mine, a modification of the Pelatan-Clercl, a further modification of the Siemens-Halske process. The process consists in passing a current of electricity through the cyanide solution containing the gold and other metals and depositing the precious metals upon a series of cathode plates suspended in the solution. It permits the use of a very attenuated solution of cyanide as low as one-tenth of a pound of cyanide to a ton of water being used. The copper, gold and silver in the solution are deposited upon metallic cathode plates in a concentrated form. The product comes off the plates in the form of a combination of gold, silver and copper about the thickness of tinfoil. The hullion product is then refined at the plant.

MADISON COUNTY.

Work has been resumed on the Garnet mine, near Pony.

It will cost nearly \$25,000 to put the new stamp mill in Red Bluff in shape for treating ore. The mill is complete, but the machinery not yet in place.

The Montana & St. Paul M. Co.'s office is at Twin Bridges. The property is on Wisconsin creek, 6 miles from Sheridan.

T. C. McGrath has sold the Boss Tweed Extension and Jeanette mines to L. Lienmann for \$30,000 in cash; the Boss Tweed Extension part of it adjoins the Boss Tweed and Clipper ground in Jeanette, 4 miles from Pony.

The Barnes-King mill, North Moccasin, is to be increased to double the present capacity.

Near Virginia City, dredge No. 2 of the Conroy M. Co. has begun operations.

S. G. Crandall of Tacoma has a lease and bond on the placer ground of the Eagle Hill M. Co. at Summit.

At the Easton mine thirty men are employed in development work on the Easton and Pacific. The second-class ore is treated at the mill, the first reserved for shipment to the smelter.

MISSOULA COUNTY.

A. P. Johnston, on Trout creek, near Cedar creek, will do considerable work there this season.

NEVADA.

DOUGLAS COUNTY.

F. Everett of the Poco Tiempo mine at Alkali lake, reports a mill erected on the property. The ore concentrates freely and reduces from ten tons to one; the concentrates assay 900 ounces silver, \$37.50 gold and 47% lead.

ESMERALDA COUNTY.

Lida, an old mining camp in southern Esmeralda, is reported as "taking a new lease of life."

A gold ledge is reported found 20 miles

from Sodaville, in the direction of Tonopah.

EUREKA COUNTY.

Ore shipments by rail from the mines of Eureka district for the week ending July 19 were as follows: Eureka Con., 36,360 pounds; Diamond, 103,520; Excelsior, 34,240; Richmond, 31,400. From Hamilton: Rocco-Homestake, 53,790.

HUMBOLDT COUNTY.

A 6-inch streak of ore in the Sheha mine, near Unionville, is said to show values of 180 ounces silver and \$10 per ton in gold.

LINCOLN COUNTY.

The Searchlight mine is using electric drills; the mill will be in operation Sept. 1.

The sale of the April Fool Co.'s group of mines and mill at De Lamar to Bamherger's De Lamar Mines Co. for \$200,000, was authorized at a meeting of stockholders in Salt Lake last week.

LYON COUNTY.

F. Leonard, Jr., in the interest of the Gold Canyon T. E. Co., for the extension of the south lateral branch of the Suro tunnel to drain the Silver City mines, is sanguine that arrangements will be concluded for beginning the work of extension.

NYE COUNTY.

J. L. Butler has charge of the affairs of the Tonopah G. C. M. Co., a claim located in early days and afterwards patented by him.

Clyde Jackson is superintendent the Tonopah & Great Western M. Co. with seven claims on about 100 acres adjoining the California. A two-compartment shaft will be sunk.

C. D. Van Duzer writes from Philadelphia, Pa., that he has formed a mining company, composed of Pennsylvania capitalists, to operate Tonopah mines.

Tonopah reports another strike in the Fraction mine. The town is lively; C. & C. trains are crowded with passengers.

STOREY COUNTY.

At a depth of 825 feet drill hole No. 1 in Potosi ground on the Brunswick lode is abandoned; a second hole will be started about 10 feet from No. 1.

WASHOE COUNTY.

A rich strike is reported from the Talylho mine, 1800 feet north of the Wedekind, at a depth of 350 feet, the lead, 4 feet wide, averaging \$150; values are largely in gold.

WHITE PINE COUNTY.

At Ely in the Chairman, the latest strike on the 200 level shows a body of ore assays from which give values of \$200.

OREGON.

BAKER COUNTY.

Ten stamps are in operation at the Golconda mill, Sumpter; C. J. Carlson is mill Supt.

Chief Surveyor West of the Sumpter Valley Road says that there will be no extension of the road for several years.

There are twenty-four mills and cyanide plants in present operation in the Sumpter district.

The Big Producer group of mines, comprising eleven claims in the Alamo district, are sold to W. R. Eisenhower of Spokane, Wash., for \$15,000 cash. The new owner intends to push development. A new hoist, capable of sinking a shaft 1500 feet, will be put in.

Sumpter reports at the Quebec mine the 10-stamp mill started up for the summer and ore in sight to keep running for six months. The Don Juan mine has been unwatered and the shaft started down with three shifts. Drifts are being run on the vein every 100 feet. The mill will be started next month.

JOSEPHINE COUNTY.

The Mountain View Copper Co. has incorporated at Kirby, W. J. McNamara, W. E. Olmstead, J. L. Lowell.

Ramsey & Ingram, two miners of Grant's Pass, say they have discovered a nickel ledge, Butcherknife creek, western Josephine county, with a width of 100 feet and exposed for 200 feet up either wall of Butcherknife creek, at the point where that stream cuts through it. Serpentine is the predominating formation.

SOUTH DAKOTA.

LAWRENCE COUNTY.

The Columbus Con. G. M. & M. Co., organized by H. J. Mayham of Denver, N. T. Mason and A. Baldwin of Deadwood, has property embracing nearly all of the townsite of Central City.

The Hidden Fortune Co., in its main working tunnel on Deadwood gulch, has driven it 1800 feet along the strike of the gold ledges of the Belt mines.

The Spearfish G. M. Co. have a gold brick weighing 834 ounces, sold to the Denver mint for \$15,025.30, from the property at Ragged Top. The mill will handle about 6000 tons a month. It costs \$1.86 a ton to mine, treat and ship ore. The ore averages between \$4 and \$7 a ton.

UTAH.

BEAVER COUNTY.

The Blue Acre M. Co. has incorporated, H. M. Crowther, Salt Lake, president; M. H. Wait, Kansas City, Mo., secretary. The company owns 636 acres near Milford. Manager Crowther is sinking in copper ore.

Near Beaver, Brooks & Ferris, owners Lone Cabin group, on North Creek, have started work on a tunnel 1000 feet long, to cut the vein at a depth of 1500 feet. The surface is gashed with veins, and some gold ore has been found.

JUAB COUNTY.

The Mammoth mill is dropping fifty-five stamps on an average of 135 tons of ore daily.

SALT LAKE COUNTY.

R. W. Rodgers, Supt. Dalton & Lark group at Bingham, has the main tunnel driven 3400 feet from its portal; work is progressing in both directions from the headings at the bottom of the shaft.

TOOELE COUNTY.

Supt. G. Z. Edwards of the Con. Mercur furnishes figures concerning the recent free gold strike that indicate extraordinary strength, justifying the belief of some engineers concerning it, of an added value of \$2,000,000.

WASHINGTON.

FERRY COUNTY.

At Wauconda the mill is idle, but the manager states that it will soon be running again.

Supt. Crummer of the San Poil has men at work stoping ore in that property.

WHATCOM COUNTY.

Sumas reports that Supt. Wm. Martin of the Gold Run M. & M. Co. is developing the company's property on Red Mountain, in the Mount Baker district. G. Pierce, of the Pierce G. M. Co., says the tunnel is driven along the lode 120 feet.

WYOMING.

Sixty of an order for 400 new side-dump ore cars have been received at Cheyenne by the Colorado & Southern and placed in service in the ore traffic between the Sunrise iron mines and the smelter of the Colorado Fuel & Iron Co. at Pueblo, Colo. The average daily tonnage from the Sunrise mines is to be increased from thirty to sixty tons.

FOREIGN.

BRITISH COLUMBIA.

The Trall refinery reports that the new process of refining by means of electricity is a success. The daily ten-ton refined product turned out by the plant is .999 pure; in 1000 pounds of lead turned out there is but one pound of material other than pure lead.

During the week ending the 19th Rossland mines produced 6730 tons of ore, as follows: Le Roi, 5100 tons; Le Roi No. 2, 1500 tons; Giant, 130 tons. The total for the year to date is 179,376 tons.

The Granby mines, at Phoenix, have resumed work; the output of the district is below the ordinary standard. Recently 2330 tons were sent to the various smelters, making a total for the year of 259,854 tons. The Rossland mines shipped 7000 tons during the same period, making the year's total to date 172,646 tons.

MEXICO.

SONORA.

Phelps, Dodge & Co. of New York now control the Indiana-Sonora mining properties at La Cananea, adjoining those of the Greene Con. M. Co., and form a wedge in the Greene mines. S. A. Provot, formerly of the Copper Queen smelters, will be the Supt.

The Cananea Railroad has been sold to the Nacabo Pacific. The road runs from Nacabo to Cananea, 45 miles.

SOUTH AFRICA.

U. S. Consular Agent W. D. Gordan, of Johannesburg, says he has been asked to secure information in regard to automatic scales, or automatic registering devices, which can be attached to scales used in weighing ore.

Obituary.

JOHN W. MACKAY.

John W. Mackay, a typical miner, and the last survivor of the famous four, Mackay, Fair, Flood & O'Brien, died in London on the 20th inst., in the seventy-first year of his age. Mackay was born in Dublin, Ireland, came to California in 1851, mined in Downville, Sierra county, Cal., learned a little and knew that little well, kept on learning mining, went to Virginia City, Nev., started a tunnel, failed, got a job at \$4 a day timbering in the Mexican mine there, mined a little on his own account at Gold Hill, and about 1863 began to get a good idea of conditions and

requirements in that vicinity. He started in on what was afterward known as the Comstock, but, his money giving out, he got Flood & O'Brien, two San Francisco men, to go in with him. Subsequently J. G. Fair became a "partner." Mackay was the miner, and worked resolutely, the others supplying the money, disregarding scoffs and rebuffs, saying, "I know it's there, and I am going to get it." At one time he had spent \$450,000 of the firm's money, with nothing to show for it but considerable development work. Finally the "bonanza" was struck, in 1873, Mackay working right along as mine superintendent, while he and Fair took out \$150,000,000 gold and silver from one mine alone.

This is but the barest, baldest recital of years of privation and dazzling success, but, whether packing his dinner bucket or handling millions, Mackay was always the same—generous, charitable, and ready to recognize anyone and everyone.

When he left the Comstock he was among the world's richest men. He invested largely in San Francisco, then in New York, and then plunged into financial enterprises that attracted world-wide attention. He laid two cables from the United States to England and France, and was just arranging for a cable from the United States to the Philippines when death called him.

He never hoarded money; he gave away millions, made many men's lives glad, and was creative of conditions. He was probably the best known miner in the country and in his day was the most dazzling and successful. There was no "luck" about Mackay's career. He had nerve, knowledge and sticktoitiveness, and won out. His death awakens a multitude of reminiscences of the old days, and a hundred columns could be written of his career without exhausting the subject.

Commercial Paragraphs.

JONES & LAUGHLIN of Pittsburg, Pa., are continually making additions to their electrical equipment, and have just recently ordered from the Westinghouse Electric & Manufacturing Co. one 800 K.W. direct connected generator, two 150 K.W., motor-driven, two-phase alternators, and two 125-light, motor-driven arc generators.

The Ironside Co., Columbus, Ohio, report a substantial increase of business during its last fiscal year, recently ended, with encouraging prospects for continued growth in the current year. Its manufactures comprise special lubricants for ropes, gears and machinery, not only to protect against wear, but also to resist the corrosive action common to mining operations.

The C. O. Bartlett & Snow Co. of Cleveland, Ohio, are putting in a drier for drying coal for the McCormick Harvesting Machine Co., Chicago, Ill., their object being to first dry, then grind the coal into dust and use it in this form in their annealing ovens. They are also furnishing one of their large driers for the Indianapolis Water Co., Indianapolis, Ind., for the same purpose, to be used in the water works boilers in place of natural gas. There is quite a saving in this process.

POPULAR MECHANICS of the 10th inst. has an illustrated article descriptive of an aerial tramway built by A. Leschen & Sons Rope Co., St. Louis, Mo., in 1900 for the American Gold Mining Co. at Ouray, Colo. The line is 4200 feet long. The loaded buckets run on an 1½-inch rope, the empties returning on a 1-inch rope, the buckets being propelled by a ½-inch endless steel wire rope, which passes around one 8-foot sheave at both the terminals of the line. Each bucket has a capacity of 6½ cubic feet. The St. Louis firm is now building a tramway of the same gravity type at Encampment, Wyo., to be 16 miles long, the longest tramway of the kind in the country.

A. TAIT, assistant manager George Angus & Co., Ltd., Newcastle-on-Tyne, England, one of the largest leather belting manufacturers of the United Kingdom, is spending two weeks in Syracuse, N. Y., having come to this country especially to visit the works of the New Process Raw Hide Co. An arrangement was made with Messrs. Angus & Co. by T. W. Meacham, president of the local company, during his recent visit abroad, whereby the English concern is to establish a plant in England for the manufacture of rawhide gears and other products under the patents and processes of the local company and using the latter company's trademark. This plant, it is expected, will take care of the company's business not only in Great Britain, but throughout Europe. Upon Mr. Tait's return to England, he will place orders with American firms for the latest gear-making machinery. Messrs. Angus & Co. have been the agents of the New Process Raw Hide Co. for Great Britain for eight years.

Personal.

PERCY GARDNER is Supt. Delaware mine, Carson, Nev.

FRANK ROBBINS of British Columbia is in San Francisco, Cal.

DUNOAN FALCONER is Supt. Tenabo M. Co. at Cortez, Nev.

J. P. REUTER is Supt. Mt. Goram M. & M. Co., Dutton, Colo.

J. C. SHERMAN is manager the Placer M. Co., Pactola, South Dakota.

G. A. WANDER is manager Cerbat Mining & Reduction Co., Cerbat, Ariz.

JAMES D. HAGUE, president North Star M. Co., is visiting Grass Valley, Cal.

GEORGE H. ROBINSON has returned to Salt Lake City, Utah, from London.

U. B. CURTIS and T. L. ODDIE of Tonopah, Nev., are in San Francisco.

CHARLES MOYER, president Western Federation of Miners, is at Fernie, B. C.

R. B. TURNER is now superintendent Kearsarge mine, Virginia City, Montana.

A. J. McDONNELL has been re-elected Supt. Union Con. M. Co., Virginia, Nev.

WM. TYACK succeeds Robert Ousby as foreman Kennedy mine, Amador county, Cal.

WM. M. MILLER now has charge of the Chase mine, Russell Gulch, Gilpin county, Colo.

J. M. SHALLER is the new manager Burns-Moore M. & T. Co., Idaho Springs, Colo.

E. F. ROBERTS has been elected manager Deer Lick M. Co., Spearfish, South Dakota.

W. B. KEHOE of Spokane, Wash., is examining Shasta county, Cal., mining properties.

B. ROSS succeeds W. M. Tanner as manager Bertha mine and mill, Idaho Springs, Colo.

JOSEPH DIXON takes charge next week of the Antelope mine, 11 miles from Phillipsburg, Mont.

WM. WEBBER of Sacramento, Cal., has gone to superintend his mining interests in South Africa.

MANAGER ROCKWELL has returned from Chicago to the Minnie Moore mine, Bellevue, Idaho.

C. PLATONOW, representing Baku, Russia, oil interests, is examining the oil fields of California.

E. M. DE DA VERGNE has been elected general manager the Elkton Con. Co., Cripple Creek, Colo.

A. R. GIBSON, president Gibson Dev. Co. and American Con. Copper Co., is visiting Clifton, Ariz.

R. E. PALMER, formerly chief engineer Le Roi, B. C., mine, is now assistant Supt. Rio Tinto mine, Spain.

JNO. MOORE of West Point, Cal., late foreman at Treadwell mine, Alaska, goes to South Africa next month.

GEORGE DERN, manager Con. Mercur mines and mills at Mercur, Utah, has returned there from New Jersey.

S. A. PROVOT will be the Supt. of the newly acquired Indiana-Sonora properties at La Cananea, Sonora, Mexico.

A. DE WET, who has been operating the diamond drill in mining camps in Peru, has gone to New York City.

J. T. SIMMONDS, long time shift boss Bunker Hill mine, Wardner, Idaho, has gone to Johannesburg, South Africa.

CHARLES WIER has been elected general manager Yellow Aster M. & M. Co., Randburg, Cal. E. H. Barton continues as Supt.

LEWIS T. WRIGHT, general manager Mountain Copper Co., Keswick, Cal., goes to Europe next month for a two months' sojourn.

P. J. NEVINS has resigned the management of the French Gulch M. Co., Breckenridge, Colo., and is succeeded by J. C. Whisler.

C. W. AMENT, president Golden Drift M. Co., says he will bring a trainload of people from Chicago to Grant's Pass, Or., next month.

A. H. BROOKS of U. S. Geological Survey in Alaska, expects to go as far as the Tanana river, thence to Circle City and Forty Mile district.

P. P. SWINDLER, formerly superintendent De Lamar, Nevada, mines, is in charge of the Searchlight property, Searchlight, Nevada.

F. N. NEWELL, W. W. WEED, W. LINDOREN and R. N. CHAPMAN of the U. S. Geological Survey will attend the Mining Congress at Butte, Mont.

W. L. BELL, for some years Supt. Candelaria M. Co., Juarez, Mexico, has been appointed manager of a copper company in New South Wales, Australasia.

G. A. YAEGER is general manager and M. M. Pender Supt. Chicago & Colorado

M. & D. Co., operating the M. M. mine, Ute creek, near Georgetown, Colo.

F. S. MASSON is general manager Arizona Construction Co., which proposes to build an electrical power plant 50 miles from Prescott for the Arizona Power Co.

L. CRONIN, Supt. Camp Bird mine, Ouray, Colo., who tendered his resignation, to take effect August 1, was killed on the 24th by falling 120 feet through a manhole in the mine.

F. A. JONES, the retiring director of the New Mexico School of Mines, has gone from Socorro to Albuquerque and has taken position as field assistant with the U. S. Geological Survey.

R. D. HUNTER, Denver, Colo., manager Sullivan Machinery Co., has gone to South Africa, to be absent till January 1, 1903. In the interim the Denver office will be in charge of W. P. J. Dinsmoor.

C. F. URQUHART, of the U. S. Geological Survey, is in Baker City, Or., to extend the system of triangulation to be utilized in making a topographical map of the country north and east of that city.

J. D. YOUNG, a Chicago mining engineer and chemist, has been examining and reporting upon copper properties in Vernon county, Wis. J. Eddy, representing Prof. Young, has been examining bituminous coal mines near Cornell, Ill., for Chicago men.

A. J. McMILLAN, the new director of the Le Roi Co., Rossland, B. C., says that Manager John H. McKenzie has tendered his resignation, but that he has consented to remain in office until his successor is appointed. No information is given out as to the identity of the new manager, though B. nard McDonald is locally mentioned.

PROFS. R. A. S. REDMAYNE AND T. TURNER, who hold respectively the chairs of mining and metallurgy in the University of Birmingham, are at present in America, investigating our technological schools with a view to the arrangement of their departments in Birmingham. Prof. Redmayne is quoted as saying: "In no part of England, nor anywhere on the continent, in fact, can you find a school of mining or a department of metallurgy in any university that can in any way compare with those to be found in Canadian and American universities."

F. KLEPETKO has resigned as general manager Boston & Montana mines, Butte, Mont., and smelters in Anaconda and Great Falls, Mont. Next month he goes to New York to take the position of consulting engineer of the Corra de Pasco mines, Peru, South America. He will make New York his home. The mine to which he goes is said to be the largest single deposit of copper in the world and is being developed by J. B. Haggin of New York and his associates. These mines, famous as silver producers for 250 years, were worked by the Incas before that. Later investigations show great copper deposits; \$3,000,000 is said to have been expended by the present company in securing four-fifths of the mineral region. The mines are 80 miles from Oroya. A railway is to be built to cost \$2,000,000, connecting them with the Oroya Railway, terminating at the port of Callao. This road will be standard gauge and cross a ridge of the Andes at an elevation of 14,000 feet. With the exception of two short lengths of 3%, the average grade will be 1½%.

Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

STEAM GENERATOR.—No. 704,743. July 15, 1902. J. L. Gironx, Jerome, Ariz. This invention is especially designed for the employment of a fuel which can be continuously supplied and removed when exhausted. Also it is intended to use the slag from smelting furnaces and the like, though other forms of fuel may be employed in conjunction with a generator of this description. It consists of an annular, tubular and horizontally revolvable shell, a continuous firebox or furnace in the form of an open channel with one side, and the means for continuously supplying the fuel at one point, and means for removing it when the heat is exhausted.

OIL AND AIR MIXING AND GAS GENERATING APPARATUS.—No. 704,732. July 15, 1902. J. Behm, San Francisco, Cal. This invention relates to an apparatus for burning petroleum oil. It consists in mechanism for separating and introducing compressed air and the oil and for comminuting the oil and intermingling or mixing it with the air and heating the mixture and jets through which it is discharged, with means for delivering it to the point where combustion is to take place.

CENTRIFUGAL PUMP RUNNER.—No. 704,756. July 15, 1902. F. Ray, San Francisco, Cal., one-half assigned to James Spiers of same place. This invention relates to improvements in centrifugal pump runners of the class known as "closed" type. It consists in the combination in a centrifugal pump of a casing with suction in a centrifugal pump of a closed runner revolvable within said casing, said runner consisting of radial

vanee of less peripheral diameter than the interior of the casing, and disks fixed in parallel planes upon each side of the vane, said disks having a diameter equal to the interior diameter of the casing less clearance.

New Patents.

DEWEY, STRONG & CO.'S SCIENTIFIC PRESS PATENT AGENCY, 330 Market St., S. F., has official reports of the following U. S. patents issued to Pacific coast inventors:

FOR THE WEEK ENDING JULY 15, 1902.

704,496.—CIRCUIT BREAKER—B. Ballentine, Sumpster, Or.
704,672.—VELOCIPED—H. Berry, S. F.
704,581.—ELECTRIC LAMP—H. W. Beecher, Port Townsend, Wash.
704,732.—GAS GENERATOR—J. Bebm, S. F.
704,773.—TANK HOOP LUG—A. J. Behrens, S. F.
704,735.—ALARM CLOCK—W. C. Bethel, Seattle, Wash.
704,371.—FLUME GATE—E. Campbell, Redlands, Cal.
704,616.—MOTOR VEHICLE—H. Charles, Kofa, Ariz.
704,532.—CURTAIN SUPPORT—J. Gale, S. F.
704,743.—STEAM GENERATOR—J. L. Giroux, Jerome, Ariz.
704,923.—DRAPER—W. T. Gordon, Juniper, Or.
704,972.—BOTTLE COVER—F. T. Griffin, Los Angeles, Cal.
704,539.—TANK—E. N. Harmon, Belvedere, Cal.
704,978.—SHIP'S BERTH—A. W. Hitt, S. F.
704,746.—LOCK FOR SIDEWALK DOORS—P. H. Jackson, S. F.
704,977.—GAS GENERATOR—F. L. Kinoid, Stockton, Cal.
704,551.—PARCEL CARRIER—Lambert & Joy, Portland, Or.
704,557.—CHECK VALVE—W. R. Michener, Oakland, Cal.
704,901.—BICYCLE—F. C. Moore, San Bernardino, Cal.
704,660.—BAKE OVEN—J. Nestor, Tacoma, Wash.
704,910.—RAT TRAP—F. Olafsen, Tacoma, Wash.
704,687.—GAS GENERATOR—P. B. Perkins, Los Angeles, Cal.
704,756.—PUMP RUNNER—F. Ray, S. F.
704,588.—STEAM BOILER—J. P. Simmons, S. F.
704,666.—CAMERA SUPPORT—J. R. Stephens, Portland, Or.
704,768.—FREEZER AND CHURN—S. Sweeney, S. F.
704,697.—SCREEN HANGER—A. L. Taber, Corona, Cal.
704,717.—FUEL—B. M. Thomas, S. F.
704,723.—BELT CARRIER—J. Weichhart, S. F.

Latest Market Reports.

SAN FRANCISCO, July 25, 1902.

METALS.

SILVER.—Per oz., Troy: London, 24½d (standard ounce, 925 fine); New York, bar silver, 52½c, refined (1000 fine); San Francisco, 53c; Mexican dollars, 43½c; San Francisco, 41½c New York.

COPPER.—New York: Standard, \$11.35@11.50; Lake, 1 to 3 casks, \$11.75; carload lots, \$11.50; Electrolytic, 1 to 3 casks, \$11.75; carload lots, \$11.50; Casting, 1 to 3 casks, \$11.65; carload lots, \$11.50. San Francisco: \$14.00. Mill copper plates, \$17.00; bars, 18@24c. London: 253 13s 9d spot, per ton.

LEAD.—New York, 4.12½; Salt Lake City, \$3.50; St. Louis, \$4.00; San Francisco, \$4.50; carload lots, 4½c 1000 to 4000 lbs.; pipe 5½, sheet 6, bar 5½c; pig, \$4.75. London: £11 5s per ton.

SPELTER.—New York, \$5.37½; St. Louis, \$4.50; London, £19 5s per ton; San Francisco, ton lots, 5½c; 100-lb lots, 6½c.

ANTIMONY.—New York, Cookson's, 10c; Hallett's, 9c; San Francisco, 1000-lb. lots, 10c; 300 to 500 lbs., 11c; 100-lb. lots, 13@15c.

TIN.—New York, pig, \$28.25; San Francisco, ton lots, 31c; 1000 lbs., 31c; 500 lbs., 31½c; 200 lbs., 32c; less, 32½c; bar tin, 3½c, 37½c. London, £128 spot.

PLATINUM.—San Francisco, crude, \$18.25 ½ oz.; New York, \$19.00 per Troy oz.

QUICKSILVER.—New York, \$48.00 large lots; London, £8 16s; San Francisco, local, \$46.50 ½ flask of 76½ lbs.; Denver, \$50.00. Export, \$44.50.

BABBITT METAL.—San Francisco, No. 1, 10½c.

ALUMINUM.—New York, No. 1, 99% pure ingots, 35c; No. 2, 90%, 30c to 35c.

SOLDER.—Half-and-half, 100-lb. lots, 20c; San Francisco, Plumbers', 100-lb. lots, 16½c.

NICKEL.—New York, 55@60c ½ lb.

STRUCTURAL MATERIALS.

IRON.—Pittsburg, Bessemer pig, \$22.00; gray forge, \$21.00; San Francisco, bar, 3c ½ lb., 3½c in small quantities.

STEEL.—Bessemer billets, Pittsburg, \$33 and \$34; open hearth billets, \$35.00; San Francisco, bar, 7c to 12c per lb.

CHICAGO CURRENT QUOTATIONS.

Bessemer.....\$23.00@24.50
Foundry Northern 1.....22.00@23.00
Northern 2.....21.50@22.50
Northern 3.....21.00@22.00
Southern 1.....21.15@22.15
Southern 2.....20.65@22.15
Southern 3.....20.15@21.15
Forge.....19.65@20.65
Charcoal.....24.00@24.50
Billets, Bessemer.....33.00@34.00
Bars, iron.....1.80@1.90
Bars, steel.....1.75@1.85
Rails, standard.....28.00@30.00
Rails, light.....34.00@40.00
Plates, boiler.....1.90@2.00
Tank.....1.75@1.80
Sheets, 26 store.....3.25@3.40
No. 27.....3.35@3.50

No. 28.....3.45@3.60
Angles.....1.75@1.80
Beams.....1.75@1.85
Tees.....1.80@2.00
Zees.....1.75@2.25
Channels.....1.75@2.25
Steel melting scrap.....19.00@20.00
No. 1 railroad wrought.....21.00@22.00
No. 1 cast, net ton.....15.00@16.00
Iron rails.....24.00@25.00
Car wheels.....21.00@22.00
Cast borings.....10.00@10.50
Turnings.....14.00@14.50

CEMENT.—Germania, \$2.75; K. B. & S., \$2.75; Hewmoor, \$2.65; Trowell, \$2.65; Portland, \$3.25 per bbl.

LIME.—Santa Cruz, \$1.70; Roche Harbor, \$1.65 per bbl.

LUMBER.—(Retail): Pine, ordinary sizes, \$19.50@22.00; extra sizes higher; redwood, \$21.50@22.00; lath, 4 feet, \$4.00 @4.25; pickets, \$19.50; shingles, \$2.35 for No. 1 and \$2.00 for No. 2; shakes, \$13.50 for split and \$14.50 for sawed; rustic, \$26.00 @32.00.

NAILS.—Per keg (list prices): No. 20d to 60d, Wire, \$3.50; Cut, \$3.50; 10d to 16d, Wire, \$3.55; Cut, \$3.55; 8d, Wire, \$3.60; Cut, \$3.60; 6d and 7d, Wire, \$3.70; Cut, \$3.70; 4d and 5d, Wire, \$3.80; Cut, \$3.80; 3d, Wire, \$3.95; Cut, \$3.95; 2d, Wire, \$4.20; Cut, \$4.20. Special rates for carload lots.

GENERAL SUPPLIES.

POWDER.—F. o. b. San Francisco: No. 1, 70% nitro-glycerine, per lb., in carload lots, 15½c; less than one ton, 17½c. No. 1*, 60%, carload lots, 13½c; less than one ton, 15½c. No. 1** 50%, carload lots, 11½c; less than one ton, 13½c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2*, 35%, carload lots, 9½c; less than one ton, 11½c. No. 2** 30% carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 725 kegs, \$1.50 per keg; less car lots, \$2 per keg.

CAPS.—3x, \$5.50 per 1000; 4x, \$6.50; 5x, \$8; Lion, \$9, in lots not less than 1000.

FUSE.—Triple tape, \$3.60 per 1000 feet; double tape, \$3.00; single tape, \$2.65; Hemp, \$2.10; Cement No. 2, \$3.00; Cement No. 1, \$2.65, in lots of 3000 feet and up.

CANDLES.—Granite 6s, 16 oz., 40s., 10c ½ set; 14 oz., 40s., 9c.

COAL.—San Francisco, coast, yard prices: Wellington, \$8; Seattle, \$6.50; Coos Bay, \$5.50; Southfield, \$8.00. Cargo lots, Eastern and foreign: Wallsend, \$7.50; Brymbo, \$7.50; Pennsylvania, hd., \$14.00; Scotch, \$8; Cumberland, \$12; Cannel, \$11; Welsh Anthracite, \$13.00; Rock Springs, \$9.00, long ton; Colorado Anthracite, \$14.00. Coke, \$13 per ton in bulk, \$15 in sacks; Sunnyside, \$11.50, long ton.

CHEMICALS.—Cyanide of potassium, 98%-99%, jobbing, 27@28c ½ lb.; carloads, 25@26c; in 10-lb. tins, 38c; sulphuric acid, in carboys, 66c ½ B, 3c ½ lb.; soda ash, \$2.00 ½ lb.; hyposulphite of soda, 2½@3c ½ lb.; blue vitriol, 5½@6½c ½ lb.; borax, concentrated, 7@8c ½ lb.; chlorate of potash, 12@13c; roll sulphur, 5c; alum, 2.00@2.25; flour sulphur, French, 2½@2¾c; California refined, 1½@2c; nitric acid, in carboys, 8c ½ lb.; caustic soda, in drums, 3@4c ½ lb.; Cal. s. soda, bbis., \$1.25 @1.50 ½ lb. 100 lbs.; sks, \$1.05; chloride of lime, spot, \$2.50@2.60; nitrate of potash, in bbls, 8c; caustic potash, 10c in 40-lb. tins.

ASSAY LITHARGE.—Per lb., 8½c.

BISMUTH.—Subnitrate, per lb., \$1.60.

BONE ASH.—4c ½ lb.

BORAX.—Crystal, 7c; calcined, 25c.

CHROMIUM.—(90% and over) per lb., \$1.25.

COPPER.—Carbonate, 20c; Red oxide, ½ lb., 60c.

MERCURY.—Bichloride, ½ lb., 90c.

MOLYBDENUM.—25c ½ gramme; 1000 grammes—2½ lbs.

PHOSPHORUS.—(American) ½ lb., 80c.

SILVER.—Chloride, ½ oz., 75c; nitrate, 55c.

SODIUM.—Metal, ½ lb., \$1.00.

URANIUM.—Oxide, ½ lb., \$3.50.

ZINC.—Metallic, chemically pure, ½ lb., 50c.

ZINC.—Dust, ½ lb., 10c.

ZINC.—Sulphate, ½ lb., .04c.

(These prices are wholesale, f. o. b. San Francisco, unless otherwise noted.)

Montana State School of Mines.

The State School of Mines, located at Butte, Montana, in the midst of the greatest mining camp in the world, offers unrivalled opportunities for practical work and observation. Its third year will open September 9th. Examinations for admission or advanced standing, September 8th. For catalogue or other information, address

N. R. LEONARD, PRESIDENT.

MICHIGAN COLLEGE OF MINES.

An Engineering School with unique location, giving it unusual facilities. New Mining Engineering and Hydraulic Building, also Chemical and Metallurgical Building ready for fall term 1902. For catalogue giving list of graduates and their occupations, address

F. W. MCNAIE, Pres't, Houghton, Mich.

Recently Declared Mining Dividends.

Payable.
Lightner M. Co., Calaveras Co.,
Cal., 5 cents per share.....July 21
United G. M. Co., Victor, Colo., 1
cent per share, \$39,947.69.....Aug. 5
Quincy C. M. Co., Michigan, semi-
annual \$3 per share.....Aug. 15

SITUATIONS WANTED.

Position wanted by Assayer and Surveyor at present employed in Arizona. Will go any place. Few years' experience East and West, and a good technical education. Address A. B. C., care of Mining and Scientific Press.

WANTED.—Position as Assayer and Bookkeeper in a mine; experienced in underground work; good references; present position not desirable. Address Box No. 137, care of this office.

WANTED.—Position by a technical graduate. Am an experienced stamp and cyanide millman, good assayer and chemist. U. S. deputy mineral surveyor. Can handle any kind of a mill or mine. Address Technical, care of this office.

ASSAYER, familiar with cyanide practice, desires position as assayer, or if some capacity, in cyanide plant. Address X, care of Mining and Scientific Press.

PRACTICAL MILLMAN.—AMALGAMATOR, Cyanide Man and Assayer, wishes position. School of Mines graduate. Best references. Address R. B., care of Mining and Scientific Press.

Cyanide and Stamp Mill Superintendent open for engagement after September 1st. Graduate. A thorough assayer and chemist; also accountant. Speaks Spanish. Will go anywhere. Specialty, construction; also successful treatment of low-grade and slimy ores. References "A." Address Practical, care of Mining and Scientific Press.

MINE FOREMAN.—Young man (33) with 14 years' experience as a practical miner in Montana, Idaho, Black Hills, Arizona and California, energetic and possessed of fair technical knowledge, desires position with some progressive company. Fully conversant with standard air drills and familiar with all systems of timbering. Would like position where progressive methods applied to economical extraction would be appreciated. Foreign countries not objected to. First-class references as to ability and general reputation. Address C. M. A., care Mining and Scientific Press.

A technically educated Mining Engineer, at present employed as superintendent of mines for one of the largest corporations in Mexico, desires a change of position to the United States about July 1st. Has had 18 years' successful experience as engineer and superintendent, never having made a failure; 36 years of age; strictly temperate; a skilled designer, geologist and metallurgist, and a practical miner, as well as a hard worker and thorough business man. Reference of the highest order, including present employers. Address Supt., care this office.

EXAMINATION OR SUPERVISION

of Mines, Smelters and Mills.

Mining Engineer and Metallurgist, of unquestionable reputation and long experience, now permanently residing at Seattle, Wash., will examine or take general supervision of mines, smelters or mills, in Pacific Coast States, British Columbia or Alaska, as consulting engineer, for reliable parties. Is also reliable accountant to examine. Box 813, Seattle.

WANTED.

A YOUNG MECHANIC WITH SEVERAL EXCELLENT PATENTABLE IDEAS would like assistance of capitalist or manufacturer. No airships, just plain every-day necessities. Address J. H., care of this office.

WANTED.—A party thoroughly posted in mining who can sell mining stock in a reliable company developing its property in Idaho. References required. Address Hoosier Mining Company, Marion, Indiana.

WANTED.—BY TWO ENERGETIC AND EXPERIENCED MINING MEN the acquaintance of persons interested in the development of mining property in old Mexico. Address D. L. C., care of this office.

Wanted to Bond a Dry Placer Claim, One Rich in Flour Gold.

Must be a dry proposition. Address "Placer Claim," care this office.

MINERS' AND PROSPECTORS' GUIDE.

REVISED THIRD EDITION.

By James Irving & Co., Gold Refiners and Assayers, 128 N. Main St., Los Angeles, Cal.

Contains U. S. State and Territorial Mining Laws, as well as much useful information for miners and millmen.

Price 25 Cents.

Quicksilver

BY THE FLASK OR CARLOAD.

WEIGHT AND QUALITY GUARANTEED.

The Eureka Company,

OF SAN FRANCISCO.

320 SANSOME STREET, - SAN FRANCISCO.

Quicksilver

IN LOTS TO SUIT.

Write for Quotations.

REDINGTON & CO., 23-25-27 Second Street,

SAN FRANCISCO, CAL.

HENRY CAREY BAIRD & CO.,

INDUSTRIAL PUBLISHERS, BOOKSELLERS & IMPORTERS,
810 Walnut St., Philadelphia, Pa., U. S. A.

Our New and Revised Catalogue of Practical and Scientific Books, 92 pages, 8vo.; a Catalogue of Books on Chemistry, Mining, Prospecting, Mineralogy, Geology, Metallurgy, etc.; a Catalogue of Books on Steam and the Steam Engine, Machinery, etc.; a Catalogue of Books on Sanitary Science, Gas Fitting, Plumbing, etc., and our other Catalogues and Circulars, the whole covering every branch of Science applied to the Arts, sent free and free of postage to any one in any part of the world who will furnish his address.

ASSESSMENT NOTICES.

MARINA MARSICANO GOLD MINING COMPANY.—Location of principal place of business, Sunny Hill, Shasta County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 15th day of July, 1902, an assessment (No. 30) of five (5) cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the secretary, at the office of the company, 415 Front street, San Francisco, California. Any stock upon which this assessment shall remain unpaid on the 15th day of August, 1902, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 8th day of September, 1902, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.
CHAS. BOVONE, Secretary.
Office—415 Front street, San Francisco, California.

MAYDAY GOLD AND SILVER MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Calaveras County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 10th day of July, 1902, an assessment (No. 6) of three cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the secretary, at the office of the company, Room 405 of the clause Spruells Building, Cor. Third and Market Sts., San Francisco, California. Any stock upon which this assessment shall remain unpaid on the 15th day of August, 1902, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on TUESDAY, the 15th day of September, 1902, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.
EDWARD H. STERN, Secretary.
Office of the Company—Heald's Business College, 24 Post St., San Francisco, California.

WILLIETTA MINING AND MILLING COMPANY.—Location of principal place of business, San Francisco, California; location of works, near Jacksonville, Tuolumne County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 20th day of June, 1902, an assessment (No. 4) of one (1) cent per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the secretary, at the office of the company, Room 233 Crocker Building, corner of Post and Market streets, San Francisco, California. Any stock upon which this assessment shall remain unpaid on Monday, the 4th day of August, 1902, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on TUESDAY, the 2d day of September, 1902, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.
E. MCALLISTER, Secretary.
Office—Room 233 Crocker Building, corner of Post and Market streets, San Francisco, California.

DELINQUENT SALE NOTICE.

LARKIN MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, near Placerville, El Dorado County, California.

Notice.—There are delinquent upon the following described stock, on account of assessment (No. 13) levied on the 13th day of June, 1902, the several amounts set opposite the names of the respective shareholders, as follows:

Names.	No. Cert.	No. Shares.	Am't.
Mrs. Harriet O. Huntington.....	223	1,500	\$30.00
Mr. J. O. Huntington.....	223	1,500	20.00
F. A. Robins.....	378	500	10.00

And in accordance with law, and an order from the Board of Directors, made on the 13th day of June, 1902, so many shares of each parcel of such stock as may be necessary, will be sold at public auction, at 112 Main street, San Francisco, California, on MONDAY, the 11th day of August, 1902, at the hour of 2 o'clock P. M. of said day, to pay said delinquent assessment thereon, together with costs of advertising and expense of sale.

N. F. REMINGTON, Secretary.

Office—112 Main street, San Francisco, California.

DELINQUENT SALE NOTICE.

NATIONAL CONS. MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Rich Gulch, Shasta County, California.

Notice.—There are delinquent upon the following described stock, on account of assessment (No. 10) levied on the 2nd day of June, 1902, the several amounts set opposite the names of the respective shareholders, as follows:

Names.	No. Cert.	No. Shares.	Am't.
H. Barth.....	225	250	\$12.50

And in accordance with law, and an order from the Board of Directors, made on the 2nd day of June, 1902, so many shares of each parcel of such stock as may be necessary, will be sold at public auction, at the office of the company, 773 Mission street, San Francisco, California, on MONDAY, the 18th day of August, 1902, at the hour of 1 o'clock P. M. of said day, to pay said delinquent assessment thereon, together with costs of advertising and expense of sale.

GEO. W. FLEISSNER, Secretary.

Office—773 Mission street, San Francisco, California.

THE CALIFORNIA DEBRIS COMMISSION having received applications to mine by the hydraulic process from Fred. G. Low Jr., in the Lone Star Mine at Cromberg, Plumas County, Cal., to deposit tailings in Jackson Ravine, draining into Jackson Creek; from E. H. Wemple and A. M. Davis, in the Clippiship Mine, near St. Louis, Sierra County, Cal., to deposit tailings in Cedar Grove Ravine, draining into Slate Creek; from Cataract Gold Mining & Power Co., in the Indian Bar Placer Mine, near Spanish Ranch, Plumas County, Cal., to deposit tailings in basin draining into North Fork of Feather River; and from Geo. W. Fox, in the Doherty Mine, at Hartsburg, Plumas County, Cal., to deposit tailings in Slate Creek, gives notice that a meeting will be held in room 96 Flood Building, San Francisco, Cal., on August 4, 1902, at 1:30 P. M.

MINING AND SCIENTIFIC PRESS

Whole No. 2193.—VOLUME LXXXV.
Number 5.

SAN FRANCISCO, CAL., SATURDAY, AUGUST 2, 1902.

THREE DOLLARS PER ANNUM.
Single Copies, Ten Cents.



On the Trail to Thunder Mountain—Packed Ready to Start.



Caswell Bros.' Cabin—Ranch on Big Creek: Lou, Caswell Sitting on Extreme Left.



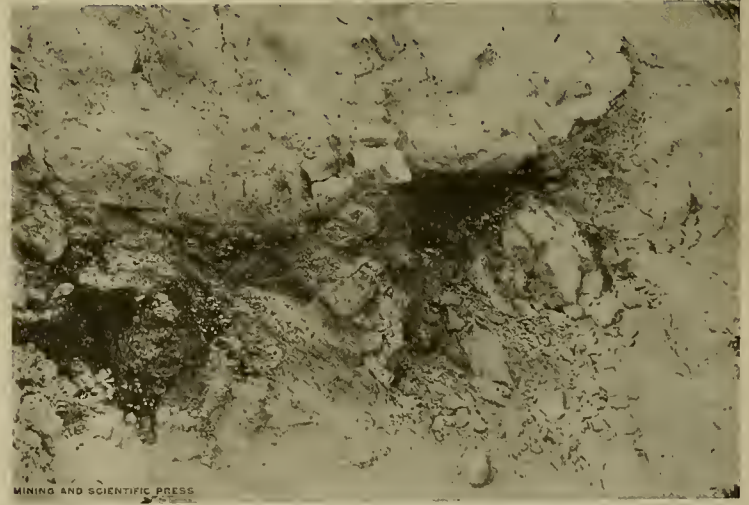
Mule Creek Cabin and Post Office, Roosevelt, Thunder Mt., Idaho: Site of Proposed 100-Stamp Mill.



Thunder Mountain City, at Mouth West Fork Monumental Creek, 8 Miles From Dewey Mine.



The Dewey Mill and Mine, Boarding House, Etc., Thunder Mountain, Idaho.



The Dewey Lead Near Apex, Thunder Mountain, Idaho.

Scenes In and Around Thunder Mountain, Idaho.

SO MUCH has appeared herein regarding Thunder Mountain—special articles, correspondence, etc.—that little remains unsaid. The pictures on this page are from photographs taken by Mr. W. B. Kehoe of Spokane, Wash., a practical miner, who thoroughly prospected that entire region. They show just how the country looked last month, and are given prominence because they are believed to be the first of the kind that have appeared anywhere.

The opinion of the MINING AND SCIENTIFIC PRESS on the subject is well understood. There is undoubtedly good prospecting ground, but so far the public has been worked more than the ground. More than usual effort has been made to create a boom, to start a rush, and there is the usual number of disappointed men. Half the effort and expense put in better localities nearer home would have produced better results—for the men who do the mining.

Meanwhile that whole region is well mineralized and is almost ideal for summer prospecting. There will be a scattering out and some good ground will be located and, subsequently, developed. So far the Caswell Bros., who sold their discovery to Col. Dewey of Pittsburg for \$100,000, have made the best "strike." They are good prospectors and also understand how to enlist the attention of newspaper reporters on the lookout for something sensational.

MINING AND SCIENTIFIC PRESS.

ESTABLISHED 1860.

Published Every Saturday at 330 Market St., San Francisco, Cal.
TELEPHONE, DAVIS 771.

ANNUAL SUBSCRIPTION:

United States, Mexico and Canada.....\$3 00
All Other Countries in the Postal Union..... 5 00

Entered at the San Francisco Postoffice as second-class mail matter.

Chicago Office (Telephone, Harrison 73).....737 Monadnock Block.
Denver Office (Telephone, Olive 733).....606 Mack Block.

J. F. HALLORAN.....Publisher.

San Francisco, August 2, 1902.

TABLE OF CONTENTS.

ILLUSTRATIONS—Scenes In and Around Thunder Mountain, Idaho—On the Trail to Thunder Mountain, Packed Ready to Start; Mule Creek Cabin and Postoffice, Roosevelt, Thunder Mountain, Idaho, Site of Proposed 100-Stamp Mill; The Dewey Mill and Mine, Etc., Thunder Mountain, Idaho; Caswell Bros.' Cabin, Ranch on Big Creek; Thunder Mountain City, at Mouth West Fork Monumental Creek, 8 Miles from Dewey Mine; The Dewey Lead Near Apex, Thunder Mountain, Idaho, 56 The Absorbent Roller, 61 White Knob Copper Co.'s Property, Mackay, Idaho, 62. Mining and Metallurgical Patents, 63.

EDITORIAL—Regarding Thunder Mountain, Idaho, 56. Absorption of Joplin, Mo., Zinc and Lead Properties; A Poor Economy; Declining Rate of Interest; Work of National Bureau of Standards; The Century of the Engineer; Production of Copper; Starting Theories About Gold Production, 57.

MINING SUMMARY—64-65-66.

LATEST MARKET REPORTS—68

MISCELLANEOUS—Concentrates, 58. Mineral Products of California for 1901; Canadian Mining Institute; Publications Received, 59. The Patio Process for Amalgamation of Silver Ores, 60. Extraction of Gold by Chlorination; The Absorbent Roller, 61. Hints to Prospectors; Resumption at Mackay, Idaho; Copper in Northern California, 62. Mining and Metallurgical Patents; Electric Blindness, 63. Personal; Commercial Paragraphs; Obituary; New Patents; Notices of Recent Patents, 67-68.

The latest merger is the absorption of the combined Joplin, Mo., zinc and lead properties by a company composed of some officers of the American Smelting & Refining Co. The latter corporation, as a corporation, does not appear in the transaction, having little to do in its general business with Missouri ores. The natural effect will manifestly be, however, that the new company may be looked upon as an adjunct or auxiliary of the American Smelting & Refining Co.

It is poor economy to keep in use a machine which requires frequent repairs. Better throw it out first than last and get one that will save money and hence make money. It is equally poor economy to do work with an old-fashioned machine when the work thus done costs more than it would on a newer improved machine, even if the new device costs considerably more money. Suppose the new machine or device or plant does cost \$5000 more. If it saves \$5 a day or makes \$5 a day the investment is a good one. Five dollars a day is easy \$1500 a year. Deducting \$250 for interest leaves a net gain of \$1250 annually, or 25% on the investment, and 25% is always good business. Nor is there anything made by keeping in machinery "that isn't worn out." It is better to work a machine for all that is in it, crowd it, wear it out, and then throw it away if there is anything in that line new and better that can be had, for the new improved machine will usually make more money for its owner than the old one possibly could.

This is the century of the engineer, for the rule of thumb is giving way to the rule of three, and in this the engineer, the man of applied science, leads. Inventiveness, ingenuity, the scientific spirit, exemplify the work to be done by the mining engineer, the metallurgical engineer, the chemical engineer, the electrical engineer, and the wide domain of the civil engineer. This is to be largely a matter of practical education, of technical training, the specialist, who has learned what to do and how to do it and yet expects to die learning, being ever ready to seize and use specialized knowledge. In this industrial battlefield, whose conflicts are constant and colossal, the engineer is to be a most prominent figure. In this regard it is to be noted that the technical school is of prime importance. We speak of the "technical school," not of the "college of engineering" or "college of chemistry," etc., tacked on as a sort of "side line" by sundry universities. The technical school is essential to the embryo engineer; later, shop practice and practical experience will give value to his laboratory

instruction. The chief difference between the technical education spoken of and the usual "college education" is that the latter is general, the former special, and this is the age of the specialist.

The work of the national bureau of standards has begun at Washington, D. C. The Government has appropriated \$250,000 for a laboratory; a \$60,000 power plant is to be placed. This is the initial of a work of prime importance to mining, metallurgy, electricity, chemistry, engineering work and applied science in general. The bureau has a tremendous amount of work to do and of a kind that involves skilled effort and patient experiment and research. Its first efforts will be to establish legal standards for all scientific measurements; then provide place for keeping legal standards of weights and measures, arrange means for correct comparison, and certificate as to accuracy of commercial appliances submitted for test. Years must necessarily elapse before much tangible result will appear, but a beginning has been made. The plan deserves the hearty co-operation and support of mining men everywhere, for it will be of ultimate economic value to all their allied interests.

The steadily declining rate of interest is having its reciprocal effect on mining investments. Twenty years ago 15% was not an uncommon rate of interest; ten years ago 10% and 12% was paid. The rate has dropped to 6, 5, 4; in savings banks 3, and it is predicted by financiers that 2%, and even 1%, will eventually be the ruling rate. Men with money turn from the present proffered 4% to the more lucrative inducements for revenue offered by judicious mine investment. In this connection, though in a different line of thought, it is to be noted that this dropping of interest rates levels things up (or down) in accordance with the theories of some socialistic reformers. It curtails the "leisure classes," and compels more men to work. Time was when the man possessed of \$50,000 could secure an annual safe return of \$5000 therefrom. Time will be when none but the millionaire can keep from active employment of some kind, as nothing less than the possession of a million will keep its owner from the necessity of having to work for a living.

MANAGER GREENE of the Greene Con. Co., just across the line in Mexico, south of Bisbee, Arizona, is locally credited with claiming ability to produce copper for 1½ cents per pound. It is not at all likely, however, that the manager of that or any other copper mining concern would make any such preposterous claim, though in the case of the Greene Co. the cost of producing copper is unusually low, not so much because of any extraordinary richness of ore or superior economic facilities for handling or treatment, but because the company has a virtual monopoly, and everything in the place pays tribute, so that if the number of pounds of copper handled be divided into the company's receipts the quotient would in that way appear to be an abnormally low cost figure of production. Just what it really does cost to produce a pound of copper is an interesting question. Much depends on locality and conditions. That word "conditions" would take every line of space available to duly explain. In the (geologically) old mines of the Lake region the market selling price has regulated the cost of production. When copper was "up," the lowest grade ores were worked, in some instances the copper costing 15 cents per pound. When copper was "down," the lean ore reserves were untouched and the higher grade ores mined. Thus, for instance, the Calumet & Hecla can produce copper at 4 cents per pound, or at 10 cents, actual cost, as circumstances arise. So with the Atlantic mine, which has been able to extract profit from ore yielding only six-tenths of 1%, or twelve pounds of copper to the ton. At the mines of the Mountain Co., in California, at Rossland, B. C., the United Verde, Arizona, the Bingham, Utah, and, in general, on the Pacific coast, entirely opposite conditions exist. Different arrangements for smelting, freights, charges, etc., difference in the ores themselves, which are young (geologically), and a variety of other causes, make cost charges figure on a different basis. The same applies to Montana. In that State costs run from 7 to 15 cents per pound. The by-products,

which may include gold and silver contents, cut considerable figure. In Utah, the Utah Consolidated has been credited with producing copper at 4 cents per pound; the United Verde, Arizona, has been similar subject of numerous statements setting 3 cents as the cost there of producing one pound of copper. At the Old Dominion M. Co., Globe, Ariz., Supt. F. W. Hoar says that for the calendar year 1901 the cost of production was 12½ cents, and that for the three months ending June 30, 1902, the cost was 10½ cents, laid down in New York. It is manifestly impossible to state just what it costs to produce a pound of copper, unless it be definitely understood what it is that the word "cost" means. So many factors may be made to enter into the problem, or so few, according to local conditions, as to preclude possibility of accuracy in any general figure.

PROF. N. S. SHALER, the geologist of Harvard University, who promulgated some startling theories about gold production some time ago, has been looking around some more, and now announces that gold is widely diffused through both the water and land of the earth and that the chief difficulty consists in getting it out. This is a proposition that does not admit of successful contradiction, even though it lack the merit of originality. The melancholy fact was learned long ago. Still the Professor admits that a great many men have overcome the difficulty, that the gold production of the world is increasing, and he thereupon figures that the first thing we know there will be "an increase in the price of anything for which money is paid," which means that gold will partly lose its present purchasing power. Prof. Shaler further argues that, as this rise in prices will increase the cost of mining gold, it will "tend to lessen the profits of such operations," and "at some point in the movement a balance would be attained which would check the further increment of the supply," or, in plain English, he thinks that if we keep on increasing the annual gold output, everything will get so dear after a while that it won't pay to mine gold any more, and that there will then be a decrease in the world's annual gold output. But the Professor, in writing this way, forgets or ignores the fact that even if there were such a general rise in prices, all other forms of mining would have to cease before gold mining itself could be affected—a condition that 20th century progress makes manifestly impossible, gold being the standard of values, monetary and otherwise. The break in Prof. Shaler's argument is lack of recognition of the one prime fact that the more gold the more money, of the value that gold alone can bestow, and that, unless gold is "demonetized" and some higher standard of monetary value created, present conditions will continue. There is, however, another phase of the whole subject that has more than an academic interest. The increased output of gold is not the direct result of gold mining per se. Nowadays there is a general tendency to having gold production lower the price of nearly all other metals mined in connection therewith. As silver some years ago began to be a by-product of lead mining in many instances, so in gold mining there is now incidental production of lead, copper and silver—that is, where the ore itself would not pay to have the gold alone extracted, other metals are now produced in the process of mining gold, and that, too, in increasing quantities, to the effect of depressing the price—under the immutable laws of supply and demand—of all metals so produced, excepting gold alone, which, being unaffected by competition, maintain its standard price. There is still another idea in connection with this, that further tends to upset Prof. Shaler's arguments and deductions. He overlooks the general progress. The great development of the world, the tremendous business activity and the consequent monetary requirements will more than offset any probable increase in gold supply. South American and South African developments, the opening up of the Orient, the inevitable change of countries now dominated by paper money to the gold standard, are among the solid answers that negative the professor's argument. The manner in which great production of gold is distributed indicates how little attention gold miners anywhere need pay to these constantly recurring articles concerning a possible gold glut.

Concentrates.

MAGNET WIRE is copper wire covered with a winding of cotton or silk thread.

MUSTARD GOLD is theoretically recognized as indication of telluride at greater depth.

ANTIMONY, finely powdered, if sifted into perfectly dry chlorine gas, will combine very rapidly with it.

THE floating debt of a corporation usually is the concern's unsecured liabilities, current unpaid accounts, etc.

ONE DOLLAR is the legal fee in Arizona for recording mineral location certificates or affidavits of annual assessment work.

TIN has been repeatedly discovered in Arizona, and the recent reports are more repetitions of former statements more or less authentic.

COAL at \$3.85 per ton is about equivalent to oil at 2½ cents per gallon. At \$2 per ton coal is 37% cheaper than oil; at \$4.85 per ton it is 20% dearer as a fuel than oil.

THE first International Mining Congress of the present series was held at Denver, Colo., July 7, 1897. The current convention will be held at Butte, Montana, next September.

WHERE working fine ore in a large size furnace "clogs things" there are but two things to do, use a smaller furnace or briquette the fine ores. The latter is feasible and uniformly satisfactory.

It is not common to ship waste as it comes from the shaft or drifts where dumpage ground is not to be had; such procedure is always costly. Where necessary a dump must be cribbed to keep it from encroaching on neighboring ground.

CHLORIDE OF MAGNESIUM in 600-pound barrels is worth 1½ cent per pound, and chloride of manganese in same shape 4 cents per pound in New York City. The two are quite dissimilar. Either in smaller quantity at the point required would cost considerably more.

THE Tomboy mine, at Telluride, Colo., is nearly 12,000 feet above the sea. The ore in that vicinity occurs in andesitic breccia, overlying Tertiary conglomerate, among the most recent rocks formed, the fact being fatal to the theory that gold is found only in the "older" rocks.

THE first elevator bucket gold dredger operated in that country was the F. L. Graves, at Bannack, Mont., in 1895. The Dieselhorst Bros., near Redding, Cal., operated a rude form of gold dredger in 1894; the first scientifically constructed gold dredger operated in California was in 1896.

CYANIDE SOLUTION is powerless in the presence of antimony. One-tenth of 1% of that metal taken up by the solution makes it worthless. Sulphuret of zinc is almost as bad. Copper carbonate in the ore makes necessary the use of sixty pounds solution to each per cent of such copper in the ore.

THERE is no legal requirement that stakes or monuments shall be maintained upon mining claims after they have been set properly, but convenience makes it manifest that such maintenance be made. It is, however, an offense against the law to pull up or remove location stakes once rightly placed by others.

NEITHER hypsulphite of soda nor calcium hypsulphite are solvents of metallic gold. Cyanide of potassium, chlorine and bromine are the three solvents of greatest commercial success, though there are several others that give laboratory results, as sodium sulphide, iodine, salt and niter, chloride of sulphur, etc.

ORDINARILY, in pyritic smelting the charge would consist of a mixture in the following proportions: Pyrites, 15%; quartz ores, 45% (containing lime and pyrites); lime ores, 20%; low-grade matte, 10%; slag, 5%; coke, 5% to 3%; and from 1% to 2% charcoal, the charge of fuel added being about 5% of the total.

THE blow struck by an air drill is usually figured at seventy-five pounds. The actual weight of the blow is not really known. The weight of the blow struck by a hammerman is greater than that struck by a power drill. The blow struck by a blow is inversely proportional to the number of blows he strikes per minute. The faster the blow the less the weight.

THERE is nothing phenomenal about the trisecting of a right angle. The radius of a circle is equal to the chord of 60°. If the radius be laid off as a chord from one extremity of the arc of a quadrant, or the arc subtending a right angle and a radius be drawn to the other extremity of the chord, the angle formed on one side will be 60°, and on the other side the angle will be 30° or one-third of a right angle.

WHILE no dictionary gives authority to use the word "inquartate," yet the prescriptive right of genius will justify an assayer in using that term to express the idea it conveys. In such cases where a suitable word is not found in the dictionary the American way is to coin a suitable word, and after some years of general use it will find its way into the dictionaries and become a permanent part of "the language."

A CUBIC YARD of gneiss will weigh, approximately, 4540 pounds. A rubble wall, carefully laid with full mortar beds and joints, will require about 0.3 cubic yard of mortar, which, if composed of one part natural cement and two parts sand, will weigh, approximately, 940 pounds. In a yard of rubble in which there is 0.3 yard

of mortar there is 0.7 yard stone; one cubic yard rubble will weigh 4118 pounds, or 152 pounds per cubic foot.

ACCORDING to laws of hydraulics determined from experiments and observations a cutoff raises the surface of the river at the foot of the cut nearly as much as it depresses it at the head. The country above the cut is relieved only at the expense of the country below. If a series of cutoffs be made, the height of the floods will be regularly decreased from a point midway in the series to the upper end, and regularly increased from the same point to the lower end.

A SIMPLE condensing engine is one having a single cylinder. The steam, after performing a certain amount of work in the cylinder, is exhausted into a condenser, where it is condensed and a vacuum formed. A non-condensing engine of any style or type is one in which the steam, after passing through the cylinder, or cylinders, as the case may be, is allowed to escape into the atmosphere, or into the heating pipes if the exhaust steam is used for heating.

THE term "unit," used in connection with tin ore, as with all other similar use, is equivalent to per centum; thus tin ore assaying 70% and never at \$2.92 per unit is worth the assay value multiplied by 2.92. One ton of ore assaying 72% would be worth therefore $72 \times 2.92 = \$210.24$ per ton. Ore assaying anything below 70% loses 3.04 cents value per unit, 68% being worth \$2.858 per unit; 60%, \$2.615; 50%, \$2.31; 40%, \$2.007; one ton of ore assaying 30% would be worth \$67.688.

MINING MEN visiting Chicago are invited to have their mail addressed to our Chicago office, 737 Monadnock Block, where they will also see what is considered one of the finest mineral museums in the country. Visitors to Colorado are also proffered the courtesies of our Denver office, 606 Mack Block, especially fitted up for the convenience of mining men. San Francisco visitors are likewise cordially invited to use similar facilities afforded by the office at 330 Market St.

AS APPLIED to measurement of electric light, the term "candle power" is obsolete and unmeaning. The standard candle is supposed to consume so many grains of its substance in an hour, but the light that it emits varies according to the plane in which it is looked at, and the condition of the wick and the atmosphere in which it is burning, and whether or not it is affected by drafts, until, upon the whole, the candle is an utterly unreliable measure of luminous intensity.

A GOOD aluminum solder is: Block tin, twenty-eight parts by weight; phosphor tin (10% phosphorus), fourteen parts; lead, three and one-half parts, and seven parts of spelter. Dirt and grease should be carefully cleaned from the surface with benzine, the solder being applied with a copper. When the molten solder covers the surface of the metal, it should be scratched through with a wire brush, by which the oxide is broken and taken up, a quick manipulation being necessary.

DYNAMITE CARTRIDGES are ordinarily 8 inches long, and are either ¾ inch, 1 inch, 1½ inch, 1¾ inch, 1½ inch, 2 inches, 3 inches or 4 inches diameter. To calculate the weight of the charge in a dynamite cartridge multiply the square of the diameter of a cartridge by its length— $\frac{1}{2}$ of the product is the weight of the cartridge in ounces. Thus the weights of the above sizes would be, respectively: 3.8 ounces, 5 ounces, 7.8 ounces, 11.3 ounces, 15.3 ounces, 1 pound 4 ounces, 2 pounds 13 ounces and 5 pounds.

IN the use of caustic soda for the prevention of scale and corrosion in boilers, the precipitation may be carried out in the boiler, only one small tank being required in which to mix the soda with the feed water. The proportion per 1000 gallons is 1½ ounce of pure caustic soda for each grain of lime per gallon; a water containing ten grains of bicarbonate per gallon would thus require fifteen ounces of caustic soda for each 1000 gallons. Carbonate of lime is soluble in 82,500 parts of pure water at freezing point.

It is not easy to state exactly "what was the biggest mass of pure gold ever found?" If the word "pure" were taken out of our inquirer's question, probably a correct answer would be citing the chunk of gold free from quartz that was taken from the Byer & Haltman claim, Hill End, N. S. W., May 10, 1872, weighing 640 pounds and worth \$148,000, which would make it about 930 fine. It was imbedded in blue slate 250 feet from the surface. It was 57 inches long, 33 inches wide, and averaged 4 inches in thickness.

A SLOW but certain way of assaying cyanide solution is to first filter two liters of the solution to which sufficient oxalic acid is added to slightly acidify it. This filtrate is evaporated in a porcelain dish and when thus drawn to a low bulk is transferred to a leaden dish with an excess of litharge and a reducing agent, or about 10 c.c. of lead acetate solution. When evaporated add borax, carbonate of soda, litharge and reducing agent (mixed together before such addition) and the ashes from the burned filter, the whole to be melted in a small pot, the resulting button to be scorified if too large for the cupel, the required silver for parting to be added to the button. This determines the gold values only.

IN the southwest of Spain are the largest open-cut copper mines in the world—the Rin Tinto, Tharsis, Penia and Calanas. Labor is so cheap there that mechanical appliances, other than railways and trucks, are not necessary and are not used. One of the mines handles nearly 2,000,000 tons of ore annually. The ore, after

the copper has been extracted, and occasionally before, is exported in great quantities to England, Germany, France and the United States, because it contains about 50% sulphur, which is used for the manufacture of sulphuric acid for the general chemical trade. On account of the peculiarities of the ore, the copper can be extracted by simple means. The ore is merely placed out in huge heaps (terros), when the copper sulphides contained in it decompose and become soluble. They are then washed out with water and precipitated into long canals by means of pig iron and scrap, thus producing metallic copper.

CONCERNING a "Concentrate" in the issue of Nov. 30, 1901, regarding the antiquity of assaying and the finding of cupels in ancient Roman relics, a Capetown, South Africa, reader writes that "Zimbabwe, in Mashonaland, Central South Africa, has ruins which show an almost modern acquaintance with the arts. Hinting at even prehistoric times evidence of abundant supplies of gold are reported—and later abundant gold in Arabia and gold in Phoenicia and Tyre was well known. Recent discoveries point to Zimbabwe, South Africa, as the place of its origin. Iron smelting furnaces are unearthed, a crude blow pipe was found and also the remains of a bellows; and discovered among other relics was unearthed an ingot mold with patterns of Phoenician gold ornaments showing they worked for the Phoenician market. Crucibles were found there and specimens brought away. The excavators found that the gold was crushed and separated by a water process, then put in clay crucibles well closed up and left for a long time in the furnace."

USUALLY the term pay shoot is a relative one, depending not only upon the presence of ore in the vein, but also upon economic conditions for mining and milling at the mine in question. Although the vein throughout the entire extent of a claim may be more or less mineralized, the pay ore will almost always be found limited to certain zones called pay shoots. The length of the pay shoot is determined by the distance a body of ore of certain magnitude, character and value continues, or nearly so, along a level driven longitudinally on the vein, the length varying, as shown in the various levels driven from end to end of such body. Should the pay shoot be proved to extend down into the fissure or whatever other the character of the ore deposit to a depth of 3000 feet, more or less, and should it be one continuous, unbroken shoot from the apex to the greatest depth attained upon it, even though its marginal lines should average only 100 feet apart, more or less, it might be argued that the true length of the shoot would be the verticality, and the true width the distance between the boundary lines indicated in the levels; and yet the length and width are not so determined. Occurring thus, it would describe an irregular oblong form, following a prescribed dip and trend, and the width would be invariably known as the length and the thickness as the width, while the length would be referred to as the vertical depth. Yet this is confusing, as it would appear from one standpoint with such form of shoot that it would be just as reasonable to call the apparent width of an ordinary house chimney the length, and the thickness the width, and to refer to the length from base to top only as the height; and there are probably people who calculate the height of a chimney as the length of the chimney. Miners sometimes call ore shoots in mines chimneys, but they refer to the length of the chimney as it is indicated in the levels.

RENEWING cylinder head packing in a gas or gasoline engine is something that should be done at least once a year under favorable conditions, but new packing may be required much more frequently unless the work is done carefully and receives attention at once when needed. The gasket usually is of such form as to include both the water jacket and cylinder head packing in one piece. The first occasion for removing the cylinder head of a gas engine should be used in making an accurate template of sheet metal by which gaskets can be cut. A template of this kind is easily made and will save much time, making also a better gasket than can be cut directly from the face of the joint. These gaskets may be made of straw board soaked in linseed oil, asbestos sheet, or one of the combination packings consisting of asbestos and rubber, with wire cloth insertion. The last is probably the best for joints somewhat roughened by rust or other cause. Any of the above materials should be thin, so as to bring the metal faces as close together as possible when the head is drawn up. These gaskets should be cut on a smooth board with a sharp chisel, and must be handled very carefully while being put in place. Asbestos sheet will make a better joint if well dampened after being put in place, as it then presses more closely into the small irregularities of the metal. Before putting on a new packing it were well to remove all traces of the old gasket and smooth the metal with emery cloth to free it from rust and any roughness in the surfaces to be joined. While the cylinder head is removed and the cooling water space accessible it should be thoroughly cleansed of all mud and scale deposited by water. With an engine provided with a separate water jacket this is not a difficult matter, as the jacket can be removed and the hard scale scraped from the cylinder. With some waters practically nothing but mud is deposited, in which case a stream of water directed into the jacket will usually clear it very thoroughly. However, if the deposit is a hard, cement-like substance, it must be scraped from the metal to which it adheres like the scale in a steam boiler.

Mineral Products of California for 1901.

State Mineralogist L. E. Aubury reports the yield and value of the mineral substances of California for 1901 as follows, as per returns received at the State Mining Bureau, San Francisco, in answer to inquiries sent to producers:

	Quantity.	Value.
Antimony.....	50 tons	\$ 8,350
Asbestos.....	110 tons	4,400
Asphalt.....	21,364 tons	312,219
Bituminous rock.....	24,052 tons	66,354
Borax (crude and refined).....	22,221 tons	982,380
Cement.....	71,800 tons	159,842
Chrome.....	130 tons	1,950
Brick.....	130,766 M	860,488
Pottery.....	55,679 tons	39,144
Coal.....	150,724 tons	401,772
Copper.....	34,931,785 lbs	5,501,782
Fullers earth.....	1,000 tons	19,500
Glass sand.....	4,500 tons	15,750
Gold.....	821,923 ozs (fine)	16,989,044
Granite.....	214,943 cu. ft.	519,285
Graphite.....	64 tons	4,480
Gypsum.....	3,875 tons	38,750
Lead.....	720,500 lbs	28,820
Lithia mica.....	1,100 tons	27,500
Lime.....	317,383 bbls	334,688
Limestone.....	76,937 tons	99,445
Macadam.....	360,883 tons	313,974
Manganese.....	425 tons	4,405
Magnesite.....	4,726 tons	43,057
Marble.....	2,945 cu. ft.	4,630
Mineral paint.....	325 tons	875
Mineral water.....	1,555,328 gals	559,057
Natural gas.....		92,034
Paving blocks.....	1,920 M	41,075
Petroleum.....	7,710,315 bbls	2,961,102
Platinum.....	250 ozs	3,200
Pyrites.....	4,578 tons	18,429
Quartz crystals.....	4,000 lbs	17,500
Quartz sand.....	500 tons	500
Quicksilver.....	26,720 flasks	1,285,014
Rubble.....	169,513 tons	327,063
Salt.....	126,218 tons	366,376
Sandstone.....	226,741 cu. ft.	192,132
Serpentine.....	89 cu. ft.	890
Soda.....	8,000 tons	400,000
Silver.....		1,229,356
Slate.....	5,100 squares	38,250
Soapstone.....	10 tons	119
Tourmaline.....	500 lbs	20,000
Turquoise.....	500 lbs	20,000

Total.....\$34,355,981

In the previous year the total product was valued at \$32,622,945; increase for 1901, \$1,733,036.

The total value of metallic substances for 1901 was \$25,052,796, an increase of \$1,694,066. This includes gold, silver, mineral paint, quicksilver, antimony, copper, lead, manganese, platinum and chrome. Silver is given in coining value. The Bureau has never independently collected statistics of precious metal output, but has used totals and distribution by county, as obtained at the U. S. Mint, San Francisco, where they have the advantages of verification by figures of receipts at U. S. Mint and assay offices, and private refineries and smelters throughout the United States.

The total value of non-metallic substances was \$2,923,201, an increase of \$746,044. This includes borax, coal, mineral waters, salt, asbestos, gypsum, magnesite, pyrites, lithia-mica, fullers earth, quartz crystals, soda, tourmaline and turquoise.

The total value of hydrocarbons and gases was \$3,432,709, a decrease of \$1,080,242, including asphalt, bituminous rock, natural gas and petroleum. The gas is given in value of that commercially utilized. The petroleum price is the average per barrel f. o. b. at the wells or stations in each county. The decrease is due to low prices for oil prevailing last year. The product was much larger, but prices much lower than previous year.

The total value of structural materials was \$2,947,275, an increase of \$373,202. This includes brick and pottery clays, hydraulic cement, lime and limestone, macadam, rubble, and concrete rock, paving blocks, marble, granite, sandstone, serpentine, slate, quartz sand and glass sand.

The relative value of the principal mineral products of the State is as follows: 1st, gold; 2nd, copper; 3d, petroleum; 4th, quicksilver; 5th, silver; 6th, borax.

The relative rank of the counties of the State, in point of mineral production, is given in the following table. In each case the value given includes that of all the mineral substances combined produced in the respective counties for the year. Some counties produce, in addition to gold and silver, five, six or seven other substances, while other counties which produce little or no gold or silver, produce in large quantities quicksilver, mineral oils, copper, lead, asphalt, structural materials, etc. The figures include aggregate value of all mineral products, including precious metals. These latter are based, as stated, upon U. S. Mint returns for the year. The term "unapportioned" includes total value of such substances as are grouped to avoid disclosing private business, as in the case of single operations in a single county. In the large and complete table just published in Bulletin No. 25 by the State Mining Bureau, from which these figures are taken, the amount and value of each substance in the respective coun-

ties is set forth. It is therefore necessary in some cases to place the figures in the "unapportioned" column.

RELATIVE RANK OF COUNTIES.

1. Shasta.....	\$ 6,737,571
2. Kern.....	2,423,918
3. Calaveras.....	2,355,372
4. Nevada.....	2,145,840
5. Amador.....	1,888,191
6. San Bernardino.....	1,844,239
7. Tuolumne.....	1,710,171
8. Los Angeles.....	1,642,591
9. Siskiyou.....	1,067,451
10. Placer.....	1,025,184
11. Butte.....	879,767
12. Alameda.....	786,366
13. Trinity.....	752,280
14. Inyo.....	668,618
15. Sierra.....	576,182
16. Mariposa.....	542,975
17. Mono.....	521,911
18. Napa.....	516,388
19. San Diego.....	514,522
20. Fresno.....	480,696
21. Santa Clara.....	421,150
22. Plumas.....	403,332
23. Madera.....	400,825
24. Ventura.....	350,570
25. El Dorado.....	347,263
26. Lake.....	331,684
27. Riverside.....	316,608
28. Sacramento.....	302,882
29. Santa Barbara.....	300,148
30. San Benito.....	255,219
31. Santa Cruz.....	195,779
32. Yuba.....	189,754
33. Orange.....	187,341
34. Sonoma.....	173,147
35. San Francisco.....	156,947
36. Marin.....	128,227
37. San Luis Obispo.....	116,083
38. Colusa.....	115,107
39. Humboldt.....	108,425
40. Contra Costa.....	101,900
41. San Joaquin.....	80,456
42. Tulare.....	69,626
43. Monterey.....	50,169
44. Stanislaus.....	29,169
45. Alpine.....	27,747
46. San Mateo.....	15,725
47. Solano.....	12,600
48. Merced.....	12,453
49. Mendocino.....	10,720
50. Del Norte.....	10,612
51. Lassen.....	6,100
52. Tehama.....	6,000
53. Kings.....	5,000
54. Yolo.....	2,300
55. Unapportioned.....	23,280

Total.....\$34,355,981

All the asbestos produced in California in 1901 was from Riverside county and all the antimony from Kern county. Asphalt was produced in the counties of Kern, Los Angeles, San Luis Obispo, San Mateo, Santa Clara, Santa Barbara and Ventura. A quantity was derived from the refining of petroleum. Bituminous rock was quarried in San Benito, San Luis Obispo and Santa Cruz counties. The borax was produced in Inyo, San Bernardino and Ventura counties. Brick clays were utilized in the counties of Alameda, Amador, Butte, Colusa, Fresno, Humboldt, Kern, Inyo, Los Angeles, Riverside, Madera, Marin, Mendocino, Sacramento, San Bernardino, San Diego, San Luis Obispo, San Mateo, Santa Barbara, Santa Clara, Shasta, Sonoma, San Joaquin, Tehama and Tulare. Clay for pottery, etc., came from Amador, Los Angeles, Placer, Riverside and Santa Cruz. The hydraulic cement all came from San Bernardino county and all the chrome from Shasta.

Coal was mined in Amador, Alameda, Contra Costa, Monterey, Orange and Riverside counties. Copper was produced in the counties of Alameda, Alpine, Amador, Calaveras, Fresno, Inyo, Kern, Mariposa, Madera, Merced, Mono, Nevada, Placer, San Bernardino, Sacramento, Shasta, Stanislaus and Trinity. While only eight counties produced copper in 1890, eighteen counties made a product of this metal last year, showing the growth of this industry.

All the fullers earth came from Kern, and all the glass sand from Monterey county. Gold was mined in thirty-five counties of the State and silver was produced in twenty-six counties. Granite was quarried for building purposes, curbing, etc., in the counties of Madera, Placer, Riverside, Sacramento, San Bernardino, San Diego, Shasta, Trinity, Tulare and Sacramento. Graphite was only mined in Sonoma county.

Gypsum was derived from the counties of Orange, Riverside and Los Angeles. Lithia-mica from San Diego, and lead from Inyo, Kern, Mariposa, Mono, San Bernardino and Tuolumne.

Lime was quarried and burned in the counties of Butte, El Dorado, Kern, Mono, Riverside, San Bernardino, Santa Cruz, Shasta and Solano; and limestone was quarried for beet sugar factories, fluxing, paving, etc., in Monterey, Napa, San Bernardino, Santa Cruz and Solano. Macadam was quarried in the counties of Alameda, Los Angeles, Marin, Monterey, Sacramento, San Benito, San Bernardino, San Francisco, San Mateo, Santa Clara, Solano and Sonoma.

Manganese came mainly from Alameda, with a small quantity from Plumas. Magnesite was mined

in Alameda, Napa, Stanislaus, Sonoma, Santa Clara and Tulare counties. All the marble quarried was from Amador county, and all the mineral paint from Calaveras and Stanislaus counties.

Mineral waters were bottled and sold from springs in the counties of Butte, Colusa, Contra Costa, Fresno, Humboldt, Lake, Mendocino, Monterey, Napa, Santa Barbara, San Benito, San Luis Obispo, Santa Clara, Shasta, Siskiyou, Solano, Sonoma and Tehama.

Natural gas was commercially used in Los Angeles, Santa Barbara, San Joaquin and Sacramento counties. Paving blocks were quarried and made in San Bernardino, Solano and Sonoma counties.

Petroleum was derived from the counties of Fresno, Kern, Los Angeles, Orange, Santa Barbara and Ventura. Platinum was found in small quantities in several counties, the most of it in Trinity. Pyrites came from Alameda and Nevada counties, quartz crystals from Calaveras, and quartz sand from Riverside.

Quicksilver was produced in the counties of Colusa, Lake, Napa, San Benito, San Luis Obispo, Santa Clara, Shasta, Sonoma and Trinity. Rubble was quarried in Alameda, Los Angeles, Madera, Marin, Monterey, Placer, Riverside, Sacramento, San Bernardino, San Diego, San Francisco, Santa Barbara and Ventura.

Salt came from Alameda, Colusa, Los Angeles, Riverside, San Mateo and San Diego counties. Sandstone was quarried in Colusa, Santa Barbara, Santa Clara, Ventura and Yolo counties. The serpentine all came from Los Angeles county, the soda from Inyo, the slate from El Dorado, soapstone from Los Angeles, tourmaline from San Diego, and turquoise from San Bernardino county.

As far as the banner counties are concerned in the different mineral products, the following is the record for 1901, with the values of material for the county named:

Alameda leads in coal (\$262,272), manganese (\$423), pyrites (\$18,000) and salt (\$324,136). Amador leads in marble (\$4630), Calaveras in quartz crystals (\$17,500), Colusa in sandstone (\$80,082), and El Dorado in slate (\$38,250). Inyo leads in lead (\$24,040) and soda (\$400,000). Kern leads in antimony (\$8350), fullers earth (\$19,500) and petroleum (\$1,131,616). Los Angeles leads in brick clays (\$264,825), gypsum (\$35,500), serpentine (\$890) and soapstone (\$119). Monterey leads in glass sand (\$15,750), Madera in granite (\$294,799), Nevada in gold (\$2,121,054) and Napa in quicksilver (\$338,176). Riverside leads in asbestos (\$4400), clays for pottery, etc. (\$16,624) and quartz sand (\$500). San Bernardino leads in borax (\$898,130), cement (\$159,842), limestone (\$76,710), rubble (\$151,447) and turquoise (\$20,000). San Diego leads in lithia-mica (\$27,500) and tourmaline (\$20,000). San Francisco quarried the most macadam (\$142,500). San Joaquin utilized the most natural gas (\$60,456). San Luis Obispo produced most values in bituminous rock (\$33,070). The most asphalt came from Santa Barbara (\$55,800). The most lime was burned in Santa Cruz (\$161,500). Shasta county made the largest product of copper (\$4,481,048), silver (\$891,994) and chrome (\$1950). The largest value in mineral waters was from Siskiyou (\$175,000). Sonoma produced the most graphite (\$4480) and paving blocks (\$32,675). The most mineral paint was from Stanislaus (\$375) and the largest quantity of magnesite from Tulare county (\$23,210).

It will be noted that only one county leads in five substances—San Bernardino. Two counties lead in four articles—Alameda and Los Angeles. Those which lead in three are Kern, Riverside and Shasta. The counties of Inyo, San Diego and Sonoma lead in two products. The other counties named in the banner counties only have the lead in one substance each.

Canadian Mining Institute.

A public meeting of the Canadian Mining Institute will be held at Nelson September 10 and 11. The preliminary announcement of papers is as follows:

"Coarse Concentration in the Slocan District," by S. S. Fowler, S. B. Nelson.

"Mine Timbering by the Square Set at Rossland," by Bernard Macdonald, M. E.

"A Comparison of Costs for Compressing Air by Steam and Electric Powers at Rossland," by William Thompson, M. E.

"Safety Lamps and Mine Explosions," by James Ainsworth, M. E., Manchester, England.

"Notes on the Machinery Constituting a Mining Plant," by Alfred C. Garde, M. E., Sandon.

"Mine Signalling by Compressed Air at Rossland," by Bernard Macdonald and William Thompson.

"The Mineral Resources of Vancouver Island," by W. M. Brewer, Vancouver.

Among the publications received this week are "Gold Belt of the Blue Mountains of Oregon," "Ore Deposits of Monte Cristo," "Ore Deposits of Elkhorn Mountain," "Rocky Mountain Coal Fields," "Pacific Coast Coal Fields," "Coal Resources of Alaska," and "Southwestern Coal Fields," issued by the United States Geological Survey, and to be had upon application to the Director United States Geological Survey, Washington, D. C.

The Patio Process for Amalgamation of Silver Ores.*

By MANUEL VALERIO ORTEGA

PATIO AMALGAMATION.—The ore extracted from the mine is sorted by pepenadores, who break the large pieces with hammers, rejecting those which contain no ore, set aside the very rich to be smelted, and deliver the rest to be crushed and pulverized for direct amalgamation in the patio. The broken lumps, of about fist size, are first ground in Chilean mills, and then reduced, in arrastras or tahonas, to fine slime.

After the lama or slime has acquired a suitable consistency by the evaporation, through the sun's heat, of a part of the water which it contained, it is spread upon the patio or amalgamating floor, where it is mixed with 5% or 6% of common salt. The next day a certain amount (depending upon the nature of the ore and the season of the year) of bluestone (copper sulphate) is added, and, immediately afterwards, mercury in the proportion of eight units to one of silver contained in the mineral, squeezed through a piece of thick cloth or chamois skin, and spread over the pulp or torta. These chemicals are thoroughly mixed with the slime by means of horses or mules trampling the torta—an operation called the repaso, and repeated daily until the treatment is finished. The time required is from two to five weeks, depending upon the quality of the ore, the temperature of the locality, and the period of the year.

Samples are taken at intervals for assay by washing in a vanning bowl, and when the tests show that amalgamation is too slow more bluestone is added. If it be too active (from the presence of copper sulphate in excess, as indicated by gray color and floured mercury), it is retarded by the introduction of lime, cement copper or wood ashes. At the end of the process it is usual in some places to make a final considerable addition of mercury, in order to collect the grains of amalgam.

Amalgamation being finished, the torta is transferred to deep circular stone vats, or settlers, through which water is passing, agitated by a revolving paddle. The amalgam and other heavy metalliferous materials collect in the bottom, while the light, earthy impurities are held in suspension and carried away.

The fluid amalgam thus obtained is squeezed through canvas bags, whereby the excess of mercury is forced out, and there remains a solid or pasty argentiferous amalgam, containing about one-fifth of its weight of silver. This is compressed into triangular segments, which are transferred to the quemaderas, or retorting houses, for the separation of the mercury by heat.

When in the solution of salt and bluestone that we are studying we add a certain quantity of mercury and the liquid is shaken there appear two kinds of precipitates, both white; but the first one is heavy, and the other floats for a long while. The one is blackened by ammonia and the other is dissolved at last and imparts a blue color to the ammonia. At the same time the mercury is subdivided and becomes gray, and sometimes black. If it is washed and rubbed hard, it separates the same white, heavy substance that we have mentioned. This is nothing but calomel, and the other is pure cuprous chloride.

Not all the cupric chloride formed is converted into cuprous chloride, for the reaction can take place only by direct contact, and the volume of mercury is very small compared with that of the pulp. Moreover, the solution of chloride of copper is weak. Supposing that for each ton of ground ore containing 700 kilos of water 3 kilos of bluestone were used, the cupric solution would not be over 0.5% in strength.

On the other hand, the accident known in practice as calentura, which is recognized by the rapid formation of mercurous chloride, is due to an excess of cuprous sulphate; whereas, if the action of the cupric chlorides formed by it would fall on the silver sulphide, its effect ought only to hasten the amalgamation without injuring the quicksilver at all.

Again, it is well known that when horn silver is submitted to the patio process it encounters the same accident, owing to the stronger affinity of chlorine than of silver for mercury; and if such a thing happens to the combination of silver and chlorine already made, how can we admit that the cupric chloride will act on the argentic sulphide in proportion to metallic mercury?

Native chloride of silver (horn silver) never has been treated successfully on the patio. This difficulty was the origin of the caso or caldron process invented by Barba, in which the reduction of such chloride is made by the metallic copper of the apparatus, and not by the quicksilver. Yet, according to the theory we are analyzing, horn silver ought to be the best ore for the patio, since nature has already operated in it the chemical combination attributed to the salt and bluestone of that process.

To show how difficult it is to treat artificial chlorides of silver by the patio I made the following test: In the lixiviation process the ores are first chloridized, in order to extract the silver by a solution of sodium hyposulphite. I took a ton of ore so pre-

pared and worked it with mercury only, as the silver was already converted into chloride, and there was no need of chemicals to chloridize it. After a month's treatment there appeared no trace of amalgamation. I then added the usual amounts of salt and bluestone. There was an immediate change in the appearance of the mercury, which became coated with a gray, opaque film; but, notwithstanding this, it did not catch any silver, and when washed out, after two months' treatment, half the weight of the quicksilver had been lost and the remainder contained very little—almost nothing—of silver.

If there were really, in the patio, a formation of chloride of silver, subsequently reduced by the mercury, the loss of mercury should be 1.85 times the weight of the silver obtained. This is not the case. In the majority of instances the total loss of quicksilver, including the inevitable waste in the several manipulations, is between 1.25 and 1.5 times the weight of silver obtained.

In the caso, as well as in the barrel, used at Freiberg, where the ores contain silver in the state of chloride, either natural or artificial, the loss of mercury is very small, say from 5% to 10% of the silver, because in those processes the reduction of the chlorides is effected by metallic copper or iron. But when those metals have been tried on the patio the result has been negative. In this respect Mr. Usler says:

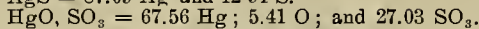
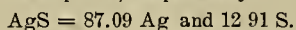
"The object of another series of experiments was to protect the quicksilver by means of metallic copper and iron, but the results were entirely different from what was expected. Where there was iron there was no amalgamation. A small quantity of copper seemed to do good, the loss of quicksilver being somewhat less; but the amalgam contained a certain amount of copper, and if the quantity of this metal was increased the resulting amalgam contained no silver, but copper."

The explanation of all this is very clear. Probably the iron was added in excess, and all the cupric chloride was reduced, and, when copper in small quantity was used, some cuprous chloride was formed; but when copper was added in greater quantity it amalgamated before the silver.

In the tortas under treatment there has never been found a single particle of chloride of silver, notwithstanding it has been looked for with positive care. It can scarcely be argued that this is the result of the reduction of the argentic salt by the mercury, because immediate contact between the two is impossible, since the argentic chloride should be dissolved in statu nascendi in the brine with which all the mass is impregnated. There cannot be, therefore, an instantaneous and complete reduction by mercury to explain the observed absence of argentic chloride in the torta—which thus constitutes a strong argument against the formation of that salt in the patio process.

The important function of the cuprous chloride is similar to that of nitrous acid in the manufacture of sulphuric acid, being only the conductor of oxygen absorbed from the atmosphere, first to oxidize the mercury, and secondly to produce sulphuric acid with the sulphur of the argentic sulphide, leaving the silver in the nascent state to form amalgam with the excess of mercury.

At first sight it seems that the loss of quicksilver should be large if this reaction occurs; but that it is, in fact, much less than the so-called consumido, which is unit per unit, will appear from the two formulas corresponding to argentic chloride and mercurous sulphate, respectively:



The oxidation of mercury explains perfectly the accident called frio in the amalgamation, which is characterized by the yellow and sometimes black color of the quicksilver as due to the insufficient strength of the cuprous solution to produce the sulphuric acid, with which the oxide of mercury must combine. This is the reason that amalgamation stops, and to remedy this defect more bluestone must be added.

It may be objected that mercurous sulphate never has been found in the tortas, but the reason is that as soon as it is formed it is converted into mercurous chloride, on account of the excess of chloride of sodium present. It is well known that mercurous sulphate is sometimes employed to prepare calomel by the method of Haermstedt and Planché.

It may be further objected: If there is no chlorination of the silver, what is the use of such an enormous quantity of salt? I think the object of that strong solution of chloride of sodium is to dissolve the cuprous chloride to facilitate its oxidizing action. According to data published by Dr. Sterry Hunt, the solubility of this chloride in a solution of salt increases remarkably with the strength and temperature of the latter. Moreover, in the pan method very little salt is used. Mr. Eisler says:

"Ten pounds of salt is put in each pan to treat half a ton of ore, at a temperature of 180° F., which quantity is about 20% of the salt used in the patio at the ordinary temperature."

It is on this account, also, that the patio treatment takes longer in winter than in summer, namely, the lower temperature diminishes the amount of cuprous chloride dissolved.

Reformed Copper Ores.

Written for the MINING AND SCIENTIFIC PRESS by J. C. GOODWIN.

SOME OF THE INFLUENCES THAT COUNTRY OR WALL ROCK OF A VEIN HAVE UPON ORES BEING DEPOSITED FROM THE BREAKING DOWN OF THE SULPHIDES OF COPPER.—As I leaned against Sentinel rock, far above the main town of Bisbee, Arizona, I looked south down a deep gulch, then to the west along the east side of the Queen hill, a sub-carboniferous limestone, dipping to the west at an angle of about 30°; on the side of the gulch that I was standing is a great feldspathic dike. Some geologists have called it a rhyolite—an eruptive dike. This dike is some 2 miles wide and from 10 to 15 long. As I looked around and studied the geology of the surrounding country I concluded that a great horizontal bed of limestone once existed for many miles in all directions. But during a continental uplift this limestone was flexured, making a great anticline. This flexure was some thousand feet in height and many miles in span. In its formation this flexure broke along the apex of its axis and through this fissure an igneous dike flowed up, dissolving the limestone for a distance of about 2 miles, forming the dike I have described; above this dike is acid in composition and contains fragments of iron sulphides below the point of decomposition.

Sentinel rock on which I leaned, although on the east side of the gulch, is not a feldspathic rock, but limestone. Farther down the gulch all of the limestone is on the west side, and yet farther down opposite the Copper King, all of the gulch is in the feldspathic rock. As I looked west high above the Copper Queen mine, to the top of Queen hill, I was convinced that at one time the limestone extended across the gulch and to the top of the rhyolite dike, and that also at one time no gulch existed where it is to-day; 500 feet above the town of Bisbee; and to the east, the contact between the limestone and rhyolite was all that would have been found. The contact, being soft, eroded easily and the formation of the gulch began. It began to cut down, down and toward the west, and a great gulch is the result. The elements did what man might not have done. It broke off the face of the west monocline and exposed a deposit of copper ore. It cut out a canyon hundreds of feet wide and hundreds of feet deep, and exposed indications that induced mining men to sink the Holbrook, the Czar and Spray shafts. This vast eroding has made it possible for the Calumet & Arizona Co. to discover copper ore.

The cutting out of this canyon discovered the Bisbee mine, and I will venture to say that if no gulch had been cut deep on the contact there would be no Bisbee to-day. I called the attention of the prospector to these facts, namely, that many great ore bodies are buried deep with no surface indications to show their presence. Originally only one outcrop of copper was exposed at Bisbee and there was no other surface indication except an iron gossan dike that contained no copper on the surface. This exposure is on the east side of the Queen hill and about 200 feet above the gulch. Erosion had broken away the eastern face of this limestone hill and exposed a solid body of oxidized copper, iron and manganese ores. This body of ore, about 60 feet by 60 feet in area, yielded about 23% of metallic copper. This ore body dipped into the hill at an angle of about 30° southeastwardly. Between the 200 and 300-foot levels it changed into clay, but below this zone copper carbonate and oxides were found that assayed about 20% in copper. At the 400-foot level on the incline from the surface this ore body terminated abruptly in hard limestone.

A large group of claims on the south slope of the Queen hill had been explored by the Neptune Co.; finding no ore, in 1880 had suspended operations. Another company, the Atlanta Mining Co., had searched for more than three years unsuccessfully for a body of ore. The Atlanta Co. decided to make one more attempt to discover ore before abandoning their enterprise. The Queen at this time had but three months of ore in sight. The Atlanta Co. concluded to sink a shaft southward of the point toward which the Queen was drifting. Neither company was following copper indications, but each was exploring the hard limestone yet almost at the time each struck a body of ore. The consolidation of these two companies and other claims constitutes the great Copper Queen Mining Co. For matter pertaining to the history and the working of the Copper Queen mine I am indebted to Prof. James Douglas. It is taken from his report on the Copper Queen, read before the American Institute of Mining Engineers.

As I stood by the side of Sentinel rock many questions entered my mind. How were these great bodies of ore now being worked originally deposited? What chemical changes and mechanical agencies had deposited some of the ores that the Copper Queen Co. are now bringing to the surface? Why were not the reformed ores the same as found in many other great mines, instead of a honeycombed quartz vein as found at Butte, Montana? What caused this vein? Why are great bodies of manganese oxide found filling great cavities high up in the limestone? Why are not manganese oxides found in all great copper mines? Did the country rock give character to the ores?

(TO BE CONTINUED.)

*Trans. Am. Inst. Mining Engineers (Condensed).

Extraction of Gold by Chlorobromuration.*

C. GROULET'S PROCESS.

NUMBER III—CONCLUDED.

Roasting is more often necessary with Groulet's chlorobromuration process than with the cyanide process, but the cost of roasting is not included in the cost of the process, inasmuch as it would also be necessary to include the profits that can be obtained with the sulphur, arsenic, antimony and tellurium, these profits exceeding the cost of roasting. With chlorobromuration, amalgamation is not employed. The ore is either treated directly after stamping or treated after concentration. The concentration is effected by means of a special table that permits, as a rule, the ore to be divided into two classes: A first class containing auriferous pulps, and a second class containing no gold, or hardly any. Numerous experiments made with ores of varied character have shown that the special costs of chlorobromuration vary from 2.10 francs to 5.50 francs per ton for a mill treating 100 tons.

An auriferous mispickel treated by chlorobromuration cost (labor, motive power, chemicals, supplies and maintenance) 5 50 francs per ton. The analysis of this ore was as follows:

	Per cent.
Silica.....	19 30
Arsenic.....	35 47
Metallic iron.....	26 29
Sulphur.....	19.03

Total.....	100.09
Gold, per ton, grams.....	36

The mean yield was 96%. With an ore of this kind no preliminary concentration was made. It would not have been advantageous from an economic point of view. An auriferous pyrites from the Transvaal gave the following results:

	Per cent
Insoluble gangue.....	93 10
Iron.....	3 01
Alumina.....	1.32
Lime.....	trace.
Sulphur.....	1.37

Total.....	98 80
Gold, per ton, grams.....	20

After stamping and roasting, without concentration, the ore was treated by chlorobromuration. The special costs of chlorobromuration amounted, in France, to 4.25 francs per ton (labor, motive power, chemicals, maintenance and supplies). These costs of chlorobromuration would amount in the Transvaal to 5.50 francs per ton, taking coal at 30 francs a ton and labor as follows:

	Francs per month
Foreman.....	1,200
Assistants.....	750
Assayer.....	900
White labor.....	400
Black labor.....	95

The same ore was concentrated on a special table and the results indicated by the following analyses were obtained:

	Pulp.	Residue.
	%	%
Silica.....	5.70	97 20
Ferric oxide and alumina.....	.....	2 06
Metallic iron.....	43.16	.....
Lime.....	.....	trace
Sulphur.....	50.22	nil

Totals.....	99 08	99.26
Gold per tons, grams.....	390	2

The concentration yielded, per ton of ore stamped:

	Kilograms.
Pulp.....	46 500
Tailings.....	953.500

Total.....1,000.000

The tailings containing two grams of gold per ton were thrown aside. The loss thus caused was 191 grams for 95.35 tons, on the assumption that the mill treats 100 tons a day.

Other experiments have been made with an auriferous pyrites from North Wales; after stamping this ore was concentrated. The following are the results of an analysis of the original ore, of the concentrates, and of the tailings:

	Original ore.	Concentrates.	Tailings.
	%	%	%
Silica.....	98.30	91.30	98.50
Ferric oxide and alumina.....	.....	.....	1.20
Metallic iron.....	0.21	2 96	.....
Lead.....	0.28	2.27	.....
Lime.....	.....	.....	trace
Sulphur.....	0.37	4.01	nil

Totals.....	99.16	100.54	99.70
Gold per ton, grams.....	3	34	nil

On concentration the ton of ore stamped yielded:

	Kilograms.
Concentrates.....	100
Tailings.....	900

Total.....1,000

*Condensed.

The special costs of chlorobromuration (labor, motive power, chemicals, supplies and maintenance) amounted to 5.20 francs per ton of concentrates. They were therefore for the ten tons of concentrates 52 francs. To these costs must be added those of concentration, 0.80 francs per ton of ore stamped, making 80 francs, and those of roasting 100 francs.

The total special costs of treatment amounted to 232 francs for 100 tons stamped, or 2.32 francs per ton stamped.

Here, however, the concentration gave no loss, and the total yield was 96.5%.

A mill treating fifty tons of ore a day by Groulet's chlorobromuration process is in operation at Harfleur, near Le Havre, France.

The Absorbent Roller.

Criticism of the wheel conveyor centers upon the rapid wearing of its supporting rollers and their

from the short life of the carrying rollers. The problem of effectively and continuously lubricating these rollers and their journals, and so preventing excessive wear, has engaged attention. Assuming correctness of theory and design in the machine as a whole, it is a perfection of details that makes success and defects failure. An invention which appears to solve the problem of roller lubrication has been patented by the Link-Belt Companies and is applied to all wheel conveyors of their manufacture. Roller lubrication produced the chambered roller, whose interior space is either filled with oil-saturated packing or supplied with oil by fingers, which, dipping into an oil reservoir in the path of rollers, lubricates the journal at intervals without the interposition of the packing. The manufacturers say that the Link-Belt absorbent roller embodies these advantages, as it is provided with fibrous packing, securing the advantage of capillary attraction and conveying oil to the journal of the roller, and combines with this automatic and convenient means of renewing the supply of oil.

Fig. 1 shows the front view of this roller. Fig. 2 is a cross section. In Fig. 3 is shown a method of supplying oil to the absorbent packing when the carrier is either wholly vertical or inclined. Under these conditions the oil is fed to the roller from an over hanging reservoir, the feed being governed by small cocks. Fig. 4 shows the method of supplying the oil on a horizontal run of conveyor, the bar or oil rod running downward from the oil tank is hinged at one end and so guided at the other that it bears on the exposed surfaces. The oil, supplied in a small and continuous flow from the oil tank, is wiped off by contact with the packing, and a continuous feed through the medium of this packing is maintained to the bearing sections of roller and journal.

There is a wide field open for the use of this invention. The principle is not one limited in its application to conveying machines, but of value for maintaining lubrication in thousands of places

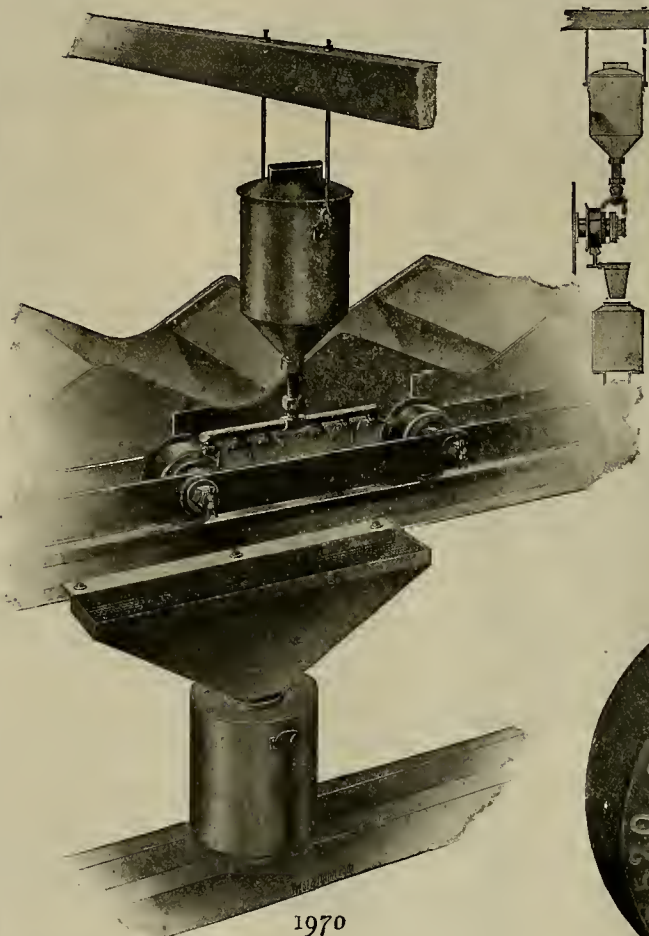


FIG. 3.



FIG. 1.



FIG. 2.



FIG. 4.

journals. Carriers and conveyors of this class are in wide and extended use; but their introduction has been hampered by knowledge of delays resulting

where intermittent oiling may cause not only destruction of bearing surfaces, but even the greater losses from fires, caused by dry bearings. The manufac-

turers of this absorbent roller assert their ability to fully meet the requirements in broad application of the invention. Experiments have been made to determine the best oil for use on the absorbent rollers. Heavy black oil is unsuitable. Best results are obtained with oil of a moderate viscosity and high lubricating quality.

Resumption at Mackay, Idaho.

Herewith is a picture taken specially for this paper of the town of Mackay, Idaho, whereat is situated the property of the White Knob Copper Co., the last mining operations with which the late Jno. W. Mackay was connected.

Conditions that recently caused the closing down of the properties of the White Knob Copper Co. have been overcome and operations are resumed after a suspension since June 26th. S. F. Boyd is general manager, J. D. A. Smith superintendent of



White Knob Copper Co.'s Property, Mackay, Idaho.

the smelter, T. Brown electrical engineer and G. R. Hancock superintendent of the mines.

It is the intention to proceed on a limited output until such time as the tunnel is completed. The new smelter will be ready September 3rd; it has a capacity for 600 tons ore daily. The railroad, 10 miles of track, 6% grade, is ready and conditions look favorable to success.

Copper in Northern California.

By J. S. DILLER.

Within the last five years northern California has taken rank among the great copper producing regions of the United States. In 1900 it stood fourth in the series, having produced over 1400 tons, with Montana, Lake Superior and Arizona, respectively, still far in the lead. The output is rapidly increasing, and bids fair to continue to do so with the operating of other mines and the erection of smelters now contemplated.

The copper region lies in Shasta county, among the hills about the northern end of the Sacramento valley, and is largely embraced in the Redding quadrangle, of which the United States Geological Survey has now ready for distribution a contoured topographic map on the scale of about 2 miles to 1 inch. Upon the completion of the topographic map the writer spent two months (August and September, 1901,) making a general geological study of the copper region in the preparation of a geologic map for folio publication. The work will be completed next summer, but, in the meantime, on account of the great geological interest in the region and its economic importance, coupled with the fact that comparatively little has been written concerning it, a preliminary note may not be out of place.

The copper region contains an extensive series of sedimentary rocks, ranging from the Miocene into the Devonian, associated with igneous masses of various ages and kinds which have intercalated or intruded the sedimentaries. A number of mountain building epochs are recorded by breaks already recognized in the stratigraphic and faunal succession, and others will doubtless be discovered in the detailed survey. The general abundance of fossils in the Cretaceous, Jurassic, Triassic, Carboniferous and Devonian sediments is such as to render it possible to work out the structure in detail with a much higher degree of probability than is usually the case.

The ore deposits of the copper region may be conveniently considered in three groups—auriferous quartz veins, sulphides in shear zones.

Auriferous quartz veins are most abundant in the western part of the copper region about Quartz Hill and Old Diggings, a few miles north of Redding, where, although the ores are generally too low grade to pay for milling, they may be smelted with the copper sulphides at a profit. The copper industry has thus invigorated the gold mining, which in the early placer days was the greater resource of the region. The quartz veins have a wide range in size and position. In the National mine a 3-foot vein strikes

north 25° west, dipping 45° to the southwest. The Texas shows a nearly vertical vein, sometimes over 5 feet thick, with strike nearly north and south, while at Quartz Hill the 40-foot vein strikes north 45° east, and dips 70° to the southeast. Further study may result in separating these veins into groups of different ages. They all contain some auriferous pyrite or native gold, and often chalcopyrite, but the vein matter is in most cases almost wholly quartz. Within the copper region nearly a dozen mines in this sort of deposit are active, and yet the output is comparatively small.

The Black Diamond mine, near Bayha, about 20 miles northeast of Redding, is an interesting example of this type. Under the management of C. Doppstein a small but well equipped force is at work developing. At the Rudolph opening slaty shales occur, dipping easterly, apparently beneath the Carboniferous limestone which forms the crest of the ridge. Small masses of pyrrhotite and chalcopyrite

occur, also pyrite and magnetite, with limonite and other secondary minerals. The ore is associated with coarsely crystalline fibrous diopside and garnet, whose relations are not so easily perceived underground, but upon the surface are illustrated at many points in the neighborhood along the contacts of diabase dikes, which cut the Carboniferous limestone. The Black Diamond mine embraces many tunnels and open cuts on both sides of the hill of Carboniferous limestone, and most of them show the effects of contact metamorphism. The best exposures are upon the crest of the limestone ridge, where it is crosscut by a number of diabase dikes running east and west and ranging from 5 to 100 feet in width. Along the edges of these dikes, in contact with the limestone at many points, pits have been dug into the iron-stained fibrous masses of diopside, mixed occasionally with garnet, serpentine and traces of ores. The fibers of diopside, several inches in length, are perpendicular to the contact and are conspicuous. The Roseman group of mines are near by upon the same dikes. All the openings and tunnels of the Roseman and Black Diamond mines were not examined, but as far as seen the small ore bodies of sulphides and magnetite were always associated with diopside in contact zones. The dike rock in question, here designated diabase, is composed largely of calcic feldspar, which generally has the optite arrangement characteristic of diabase inclosing chlorite, epidote, magnetite and quartz from the altered feldspar and pyroxenes. The amount of quartz varies, and in some cases seems a primary constituent.

A wide and very irregular belt of igneous rocks extends northeast through the copper region of Shasta county, from near Iron Mountain to beyond Bully Hill, and traverses a series of fossiliferous sedimentary rocks, ranging from the Devonian up into the Mesozoic, at least as far as to near the top of the Triassic. A large portion of this mass is volcanic, embracing acid and basic lavas with fossiliferous tuffs, which show that a portion of the series, and possibly the whole, is of Triassic age.

The igneous rocks and associated sedimentaries have been greatly compressed, folded, faulted and sheared. The shear zones in some cases have been mineralized, developing in spots by replacement irregular bodies of sulphide ore, ranging in size from a mere film or nodule to masses many hundreds of feet in greatest dimension. Deposits of this sort are the only ones which have been successfully mined.

The ore bodies thus far exploited have generally been found in igneous rocks (keratophy, closely related to quartz porphyry), although, in some cases, within a short distance of sediments. The sheared keratophy in many cases resembles shale, and is so called by the miners, but a microscopic examination readily distinguished it from the sedimentary rocks which generally contain microscopic fossils, such as radiolaria, sponge spicules and other siliceous organisms.

All the copper produced in the region under consideration comes from two districts—Iron Mountain and Bully Hill—and these deserve special mention.

(TO BE CONTINUED.)

Hints to Prospectors.

Written for the MINING AND SCIENTIFIC PRESS by
W. J. ADAMS, E. M.

The average prospector starts to explore a new country with his pick and pan, but only looks for gold and silver. He follows up the streams and gulches, and if colors of gold are found, traces them to their source. If ledges are encountered they are tested by assay for gold, silver, lead and copper; but beyond that, little if any account is taken of the rocks of the country except as curious freaks of Nature.

In the placer mining of the Black Hills the miners were troubled with heavy pebbles, locally called blackjack. On account of the weight of these and of the same mineral when found in place, it was taken for silver ore, but no silver ore could be found by assay. Finally it was discovered to be stream tin and cassiterite in a matrix of feldspar or mica.

In the beach mining along the Pacific coast line there were generally collected with the amalgam, small scales, either a dull lead color or bright-like nickel, which were heavier than the amalgam, though untouched by quicksilver. This was thrown away for years, but was nearly as valuable as the gold, ounce for ounce, consisting of platinum and its alloys.

In Colorado, at Rock Creek, a canary-yellow deposit was found, in appearance like sulphur and clay, but very heavy. This was found to be a compound of uranium and vanadium, called carnotite, and of good commercial value.

In San Diego county, California, a peculiar deposit was found carrying radiating reddish crystals. Money has been made from this through its constituent of lithium. Lately another deposit has been found where these crystals have been of various colors, some so clear as to be valuable as gems. In Siskiyou county, California, a deposit has lately been found, greenish and very hard, which is the genuine jade of great value.

There are other deposits of value, besides the gold and silver content, all over this western country, in the Sierras as well as the Rockies, and it is the object of this article to call the attention of prospectors to this phase of explorations.

The writer has made a specialty of these rarer crystallizations and commercial deposits, and writes with confidence on the subject, realizing how often valuable deposits may be passed by.

Of the metals, rutile occurs in twin crystals of a glassy red color, in a feldspar gangue, and is now commercially worked in North Carolina.

Molybdenite looks like graphite, occurs on the Pacific coast in quartz; in Mexico, in feldite, and is of value in limited quantities if over 60%. It can be concentrated by saving the slimes.

Wolframite, tungstate of iron, has been found associated with the tin ores of Temescal, Riverside county, California, and is of value.

Cassiterite, tin oxide, only found in granites or its allied minerals, never in slate.

Stibnite, antimony, is of value if near transportation, and carrying over 50% of antimony. It looks like galena, but is fibrous and lighter colored.

Chrome iron has been mined on the Pacific coast, but is not valuable till steel works are located on the hays of the Pacific.

Bismuth is found in one mine in a county near San Francisco, California, but, like the blackjack of the Black Hills, has so far been considered a valueless product by the prospector, though there is a market for a limited amount.

Lead—This occurs as carbonate (cerussite), a heavy light-colored earthy mineral; as sulphide (galena), of a bright lead color; and rarer, as wulfenite, of a bright orange color, and anglesite, the sulphate. The ores of this metal are variable in value according to the expense of transportation, the extent of the ore bodies and the percentage of the metal contents; but, with the present price of lead, many mines formerly idle should now pay a profit.

Sulphur—A bright yellow earth which is generally mixed with volcanic ash, as near Humboldt Wells, Nevada. For years the principal source of supply for the Pacific coast was in Japan, but a deposit is now being exploited in Lower California. It is possible that deposits would be found near some of the extinct volcanoes of California, such as Lassen Buttes. In spite of the increased use of iron pyrites for the manufacture of sulphuric acid, pure sulphur is in constant demand.

Graphite, "black lead"—Small quantities of this are found the length and breadth of California, but only when of superior quality can it compete with that which is artificially made.

Asbestos—A white or greenish mineral, fibrous like wool. Generally the fiber is very short, when the mineral is of little value. Though found in numerous localities on the Pacific coast, the deposits so far known are limited in size and poor in quality. A good asbestos will be associated with serpentine rocks, and should occur in the Sierra Nevada and in Siskiyou county, California. For this there is a market.

Mica in large sheets and free from iron has a ready sale.

Crystals—Not all crystals are of value, but it is the gems of which we know little that the prospector should take note, preserving in his hook for future

reference, locality, nature of country rock and extent of deposit.

A few diamonds have been found in several gold gravel mines of California, and quartz crystals, tons in weight, have been shipped from Calaveras county, California. Among other crystals, if specimens are found clear and uniformly colored, they should be saved, particularly red garnets (almandite), green garnets (ourarorite), and the long crystals of colored tourmalines; while among the gem stones, non-crystalline, very often valuable specimens of green chrysoprase, agates, onyx, cat's-eye and opals are found.

The turquoise found in California is superior to that of New Mexico, being without the iron specks of the latter.

There is no reason to doubt but that other gems exist in the mountain ranges of the Pacific coast, where we have the eruptive actions as shown particularly in the Siskiyou on the border of California and Oregon, and the ranges on the borders of southwestern Nevada and eastern California.

The Earths—Only a few of these are worthy of the prospector's attention. Kaolin, for porcelain, is too plentiful; but infusorial earth and Fuller's earth look so closely similar to it that, without chemical tests, the difference cannot be seen.

Magnesite is also white but heavy, while magnesia resembles soft chalk; but of all these the most valuable would be deposits of niter and horax, gypsum and alum.

Salt, having no magnesia, and if in a deposit of sufficient extent, should find a remunerative market and free the coast from the excessive tariff now charged.

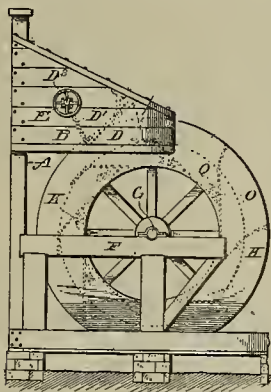
The writer suggests to all prospectors to save unknown crystals, with the data of their locality; small specimens of unknown rocks and minerals, and the data connected with them, and submit them to some competent authority for valuation. He may find he has a better proposition than a gold mine.

Mining and Metallurgical Patents.

Patents Issued July 22, 1902.

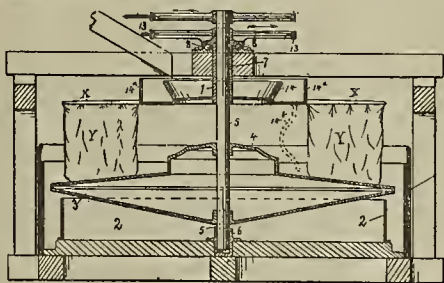
Specially Prepared for the MINING AND SCIENTIFIC PRESS.

WATER WHEEL.—No. 705,087; J. W. Houtz, Republic, Mo.



Overshot water wheel having series of stationary buckets, space intervening between inner end of bucket and wall of adjacent bucket, tubular valve positioned in each bucket and adapted to close space while bucket is being loaded with water.

ORE WASHER AND SEPARATOR.—No. 705,104; J. M. Longan, Empire City, Kan.



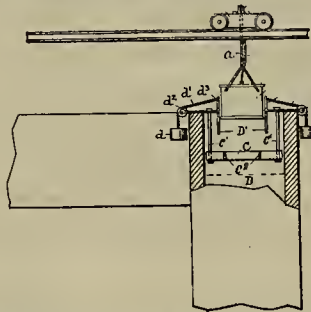
Ore washer and separator, combination of a water tank having discharge gate on one side, revolvable vertically movable float table in tank, feed hopper revolvable independently thereof, sweep connected to and carried by feed hopper, sweep being adapted to operate on table, means to raise and lower sweep, and means to adjust same.

PROCESS OF PURIFYING HYDROCARBON OILS.—No. 705,163; J. W. Warren, Omaha, Neb.

Clarifying hydrocarbon oils, treating with solution of sugar of lead; absorbing water and any foreign substances resulting from such latter operation by addition of clay of Wyoming rock-clay constitution; drawing off distillate; treating it with sulphuric acid;

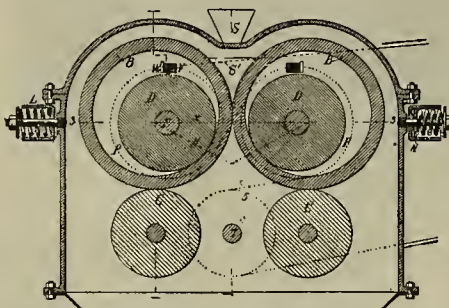
neutralizing same by addition of clay; drawing off distillate; treating it with caustic potash; allowing it to stand; retreating distillate with clay; finally, when clear, drawing off distillate.

FURNACE FEEDING APPARATUS.—No. 705,246; W. H. Howard, Pueblo, Colo.



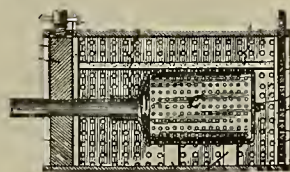
Combination with furnace, of traveling crane, feed box supported and adapted to be raised into feeding position thereby, cover for feed box also supported by crane and in path of vertical movement of box, supports for box being longer than those for cover so that when box is lowered to filling position cover will be arrested and held suspended before box reaches its lowest point.

PULVERIZER.—No. 705,323; R. Creuzhaur, Brooklyn, N. Y.



Combination with pulverizer of feeding device comprising chambered rotative cylinder, hopper above cylinder, side of which on ascending side of cylinder is extended to form shield over latter covering chambers and preventing entrance of stone into until they have reached approximately uppermost position, thereby avoiding the falling of stone into ascending chambers of cylinder, and consequent necessity of lifting weight of such stone, hopper formed with its side over descending side of cylinder, inclined toward middle terminating some distance above cylinder to prevent stone crowding upon cylinder.

STRAINER FOR MINE PUMPS.—No. 705,364; J. Kurtz, Greensburg, Pa.



Strainer attachment for suction pumps comprising box or casing having sides perforated, strainer held within box or casing, door slidably retained in one end of casing having series of apertures produced therein, hose connected to strainer, hlock arranged in forward end of box having recess produced in upper face thereof, guides arranged adjacent, movable hlock held in guides having recess produced in lower face thereof adapted to register with recess in first named hlock, screw operating in box or casing adapted for engagement with movable hlock, arms carried by screw and pin arranged upon casing adapted for engagement by one of arms of screw, means arranged within box or casing for holding said strainer in position.

METHOD OF REDUCING COPPER MATTE TO REFINED COPPER.—No. 705,109; G. Mitchell, Naco, Ariz.

Reducing copper matte to refined copper consisting in blowing copper matte in converter until practically all the iron contained in the charge has been transformed into slag, removing slag, then blowing remaining charge until it has been reduced to metallic copper and continuing blowing operation until metallic copper has been sufficiently overblown to produce small percentage of suboxide of copper and approximating as nearly as is possible amount required to prepare copper for poling, punching tuyeres during the blowing of charge to maintain constant and practically uniform distribution of air throughout charge; then charging molten contents of converter into reverberatory furnace and subjecting it to the poling process, finally casting product

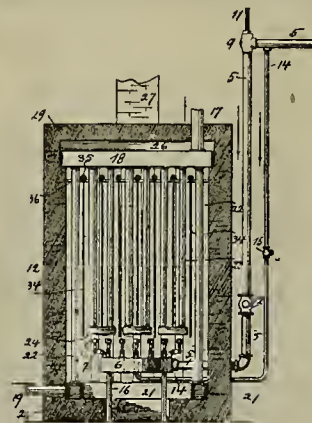
into pigs, bars or anodes. Charging two or more converter charges into reverberatory furnace, adding to such accumulated charge one or more additional converter charges blown to such a predetermined condition that when mixed with the accumulated charges they will cause the mass to contain the desired percentage of suboxide of copper.

SAFETY HOISTING HOOK FOR ORE BUCKETS, ETC.—No. 705,526; H. B. Gray, Conneaut, Ohio.



Hook for hoisting buckets and other articles, provided with safety guard, having V-shaped notch in its end and adapted to move to and from point of hook, pawl and ratchet, arranged to lock safety guard in contact with hook, notch receiving point of latter. Shank having middle opening and two corresponding curved slots in its sides and hook proper integral with it, in combination with safety guard adapted to fit on point and provided with ratchet and gudgeons, and pawl pivoted within opening arranged to engage ratchet when shank of hook tilts forward, for purpose of holding safety guard on hook point.

GAS FURNACE.—No. 705,077; F. G. Hamer, Cincinnati, Ohio.



Heating furnace, combination of outer inclosure forming heating chamber within, horizontally disposed head 18 closing upper part of chamber by being supported all around on outer inclosure, smoke chamber 26 above this head, smoke flues passing through latter and connecting heating chamber below it with smoke chamber above it, horizontally disposed hollow base 21 in lower part of heating chamber arranged around sides thereof, pipes 22 connecting base with head 18 in manner to leave space between them, drop heating tubes depending from head 18 filling this space arranged in pairs, independent joint 24, box-shaped and of copper which connects to lower end of each pair, one of tubes of such pair of larger diameter than other and means to supply heat to furnace.

Electric Blindness.

Commenting on the increasing use of the electric furnace, which is stated to induce electric blindness, a writer in the American Electrician says:

The eyes do not burn or pain at the time of exposure to the arc, but become very painful two or three hours afterward. Eyes so affected are very red, and have small white spots in them. I am informed that in many cases permanent injury is sustained, so that one can not be too careful in exposing the eyes to this powerful heat. As soon as any pain is experienced from this cause, the eyes should be bathed twice a day in cold water, from 1½ to 2 hours each time, and one drop of the remedy specified in the accompanying prescription should be put in each eye every three hours; the cold water baths should be timed so as to come midway between two applications of the eye drops:

Holocain muriatic (100)	.....3 grams
Adrenalin chloride (1000)	.....3 grams
Distilled water	.....4 cu. cm

The patient should remain indoors and wear very dark glasses until the eyes are restored to their normal condition, and direct exposure to any light should be carefully avoided.

Mining Summary.

Specially compiled and reported for the
MINING AND SCIENTIFIC PRESS.

ALASKA.

(Special Correspondence).—Development of this section is progressing and results this season will be satisfactory. The largest enterprise nearing completion is the pumping plant of the Wild Goose M. Co., C. D. Lane president, near the mouth of Smoke river, 18 inch pipes conveying the water 4 miles up the hills off Anvil creek. The W. G. M. Co. will hydraulic their claim No. 2 below discovery on Anvil creek, and also their Nos. 8, 9, 10, 11 above on Anvil creek, and the Mattle claim on the divide between Dexter and Anvil creeks.

The next biggest development work is the ditch made by Leland, Davidson & Bliss from the mouth of Hobson creek to Snow gulch and Dexter creeks. Those people are employing 300 men and 100 horses. The ditch will be a boon to Dexter creek, which is entirely dry during the larger part of the season. The work will be completed in September and should add largely to the output this season. The same company is building a ditch from the headwaters of Skootchebork to Daniels creek and El Dorado creek, where big bodies of pay gravel have been uncovered.

A ditch is in contemplation on Solomon river, where new discoveries, principally on the benches, have been made.

Ophir creek, a tributary to the Neukluk, is the banner creek of this section. On a claim No. 15 above, owned by Chas. D. Lane, a body of pay gravel 26 feet thick has been uncovered and will be worked on a large scale this season.

Near Nome, on the tundra, a number of shafts to the depth of 110 feet have been sunk, with the result of finding a body of 8 to 10 feet of pay gravel averaging 10 cents to the pan.

Otter creek, a tributary of Nome river, has been worked last winter with very gratifying results. No. 1 below discovery produced \$21,000. However, the benches are attracting a good deal of attention on that creek at present and great things are promised from that source.

There have lately been a large number of benches uncovered, and the probability is that next winter there will be a great deal of winter work done. Up to now the excessive price of coal was the only drawback in the development of the camp during the winter months.

The Kasatdegapo is attracting a little attention. Willow creek and Ruby creek are the principal producing creeks.

Concerning Candle creek, the new diggings in the Fairhaven district, very conflicting rumors are being circulated. They say the pay streak is very narrow, only 1 inch thick and 15 to 20 feet wide, and only 2 to 3 feet from the surface. In places the pay streak is rich and it may be a good rocking proposition. However, it will not pay to work the claims on a large scale. On the other hand, it is again contended that very little is known about the creek and that two months more must elapse before anything definite can be said of that section.

The Kougrook and Gold Run sections are not prospected as yet, to make any statements. The York section is being prospected for tin by several Salt Lake parties. The result is not known as yet.

Nome, July 8.

ARIZONA.

COCHISE COUNTY.

The Black Diamond Co. has bonded the Jacklin property, in the Dragon range, paying \$10,000 down. The property is 25 miles north of Douglas.

GILA COUNTY.

In the reports of the Old Dominion M. Co., by D. McViechie and F. W. Hoar, Supt., Mr. McViechie reports exclusively on a shoot of high-grade ore extending from the seventh to the twelfth level. Supt. Hoar has included in his estimate all grades of ore in the mine, believing it to be necessary, to obtain the most economical results, that all grades of ore be extracted and treated. The reports indicate that, by future development, the sulphides developed will open into large ore bodies. The directors believe that the present system of smelting ore should be changed, and for this purpose tests are now being made. From April 2 to before June 30 the floating debt was reduced from \$359,178 to \$75,783. Since April 2 the company has purchased a briquetting plant, two additional boilers and a slag reverberatory furnace. The cost of these and other improvements will amount to over \$250,000. The production of fine copper for the last calendar year was 10,094,787, and it is at present continuing at the same rate. The cost of production was 12½ cents. For

the three months ended June 30 the cost was 10½ cents per pound laid down in New York. It is believed that the cost will be reduced to 8 cents through improvements at the mine. Freight charges during the year averaged 3½ cents per pound. The railroad companies promise to give a material reduction in freight charges. The company is now paying but 1½ commission on sales, instead of 2½, as formerly, when its copper was sold by the United Metals Selling Co. Mr. McViechie, in his report, says in part: "We found 55,559 tons of high-grade sulphide ore, with an average assay value of 11.8% copper, and 53,454 tons of high-grade oxidized ore, with an average assay value of 12.7% copper. We actually found 61,732 tons of sulphides and 59,393 tons of oxidized ore, but have discounted our measurement 10%, providing against pinches or horses of rock that might occur in the vein. Our total estimate, after deducting the 10%, is 109,013 tons, having a gross value (figuring copper at 11½ cents per pound) of \$3,135,986. The ore included in this estimate is found below the seventh level. We were unable to make any estimates of the ore above the seventh level, for the reason that in this portion of the mine many of the old stopes are inaccessible. While practically all the ore that is being treated in the smelter at this time is coming from this portion of the mine, it is almost impossible to form any estimate of what the mine above the seventh level will yield." The mine above the seventh level is expected to yield some 200,000 tons of ore. Continuing, he makes a number of suggestions relative to improvements at the mine. The smelter, in his opinion, is not what the company requires to make a close saving. While the high-grade ore reserves can be considered as fairly good, they should be increased as rapidly as possible. They should be brought up to 250,000 or 300,000 tons. He advises the erection of a new smelter and converting plant, believing that the best treatment for the ore would be to blast it. A new shaft should be constructed. The saving system of mining is recommended. In conclusion, Mr. McViechie states that he sees no reason why the mine should not be a paying proposition.

In his report Supt. Hoar says that it will soon be necessary to retimber the Interloper shaft from the eighth to the tenth level. He considers that if two blast furnaces were run this shaft would be taxed to its full capacity. Additional pumping facilities are needed and the rock house should be enlarged, while the tramming facilities should be greater from the rock house to the smelter. There should be electrical haulage.

On June 30, 1902, the company had on hand 4,401.245 pounds of matte. There were also about 7000 tons of flue dust, averaging about 5 7/8% copper. By the installation of a slag reverberatory furnace, the cost of which installed would be about \$11,500, he expects to reduce the copper in the slag .462%, if not better, thereby saving per month from one furnace about \$2500, or \$30,000 per year.

Fifteen miles from Globe the Yo Tambien mine, one of ten claims owned by the Pinto Creek M. & S. Co., St. Joseph, Mo., is opened by an incline shaft 330 feet, and by two levels intersecting the shaft at 100 and 230 feet. The ore is a high-grade sulphide in a quartz gangue. There is considerable peacock copper and glance scattered through it. It carries about \$3 in gold to the ton. Supt. Teale has the erection of a concentrator under consideration.

GRAHAM COUNTY.

At the property of the New England Copper Co., near Clifton, every drop of water has to be packed 10 miles on mule back, with a climb of 5000 feet.

MARICOPA COUNTY.

Wickenburg reports a new strike in the Oro Grande mine, or the return of an ore body that was missed.

The Wickenburg S. & R. Co. has bought the Black Jack mine, 10 miles east of Wickenburg, for \$4600.

MOHAVE COUNTY.

C. K. McCormick has succeeded in raising \$250,000 in Paris for the development and equipment of the Gold Road mines, near Kingman.

PINAL COUNTY.

The Copper Hill M. Co., with mines on the west side of the Canyada del Oro, 4 miles from Oracle, will install a leaching plant of 100 tons daily capacity, and expects to have the plant in operation by January 1st. They expect to build a traction engine road from the mine to Red Rock railroad station, distant 24 miles. They have 100,000 tons of 5% carbonate and silicate ore blocked out.

SANTA CRUZ COUNTY.

C. N. Thomas of the Buena Vista M. Co. is operating its copper mines 12 miles from Nogales. Forty men are developing the property.

YAVAPAI COUNTY.

H. G. Isenminger, manager J. I. C. M. & M. Co., will work the Portland group of four quartz claims, Big Bug, and put on machinery when workings are deep enough to justify.

The Courier hears that, at the 900-foot level in the Octave mine, Weaver district, a vein of ore 5 feet wide, which carries \$200 per ton gold, is exposed; 700 feet distant from this shaft is another one 1100 feet deep, in which is exposed a vein 8 feet wide, which carries \$26 gold per ton. So much water has been struck in the bottom of this 1100-foot shaft that more powerful pumps will have to be put in before the shaft can be sunk deeper. Water to run the quartz mill is being pumped from this shaft.

G. W. Hull of Jerome will run a tunnel through the mountain adjoining the United Verde properties—the tunnel site selected by the late J. R. Dillon of the Jerome C. Co., and which he ran into the hill over 1000 feet. The tunnel, when completed, will be 3600 feet in length, and at some points will be 1200 feet beneath the surface. It crosscuts the formation. Mr. Hull expects to cut four veins or ore bodies. He estimates the total cost of the tunnel at \$30,000. The tunnel will connect with the workings of the 1888 mine.

The G. A. Treadwell M. Co. is building an oil smelter at Mayer station for the Iron Queen mine, 2 miles away. A 9-mile pipe line—3 and 4 inches in diameter—will bring water from Crystal Springs to the smelter. It is completed to a point 1 mile from the smelter site. The smelter is of 100 tons capacity, and is built under patents issued to M. P. Boss, designed to turn out blister copper at one operation.

CALIFORNIA.

The California Debris Commission reports that forty-five permits for hydraulic mining were made during the year ending June 30, 1902. Nearly all were granted. The total number of applications since 1893 was 565, of which 445 were granted. The total amount of material mined during the year under permits is estimated at 836,500 cubic yards.

ALAMEDA COUNTY.

T. P. H. Whitelaw will build an iron rolling mill and steel works in East Oakland.

AMADOR COUNTY.

(Special Correspondence).—The Standard Electric Co. have installed five 3000 H. P. alternating current dynamos here. Water from the Blue lakes and other reservoirs is impounded above the plant and furnishes the power for water wheels, constructed from special designs by the Union Iron Works. The equipment is all of the S. K. C. system; 220 volts furnished by the dynamos is transformed to 40,000 volts at the plant by means of rotary transformers, oil being used at insulating material. This is carried 175 miles to San Jose, and may even be carried to San Francisco.

Electra, July 28.

At the Sargent mine, near Jackson, a contract to sink the shaft 300 feet has been let. Price, \$10 per foot, contractors to supply candles, fuse, powder.

F. B. Joyce, owner Defender mine, has returns from fifteen tons ore, \$1643 in gold, \$1.60 to the ton silver, a trace of copper, a smelter test. He is putting up a 10-stamp mill.

The Shenandoah Con. M. & M. Co. has levied an assessment of 2 cents per share, delinquent August 22.

CALAVERAS COUNTY.

The Neverthought mine, near Jesus Maria, is operated by the Samson Con. M. Co., which is running two tunnels; W. L. Huston Supt. With proper development it will prove a dividend payer.

The Mauna Bros. mine, Wet gulch, is under option to W. Hamilton. It shows ore that will average \$10 per ton.

The Ultimo M. Co. has levied an assessment of 20 cents per share, delinquent August 30.

KERN COUNTY.

Under date of July 26 an officer of the Yellow Aster M. & M. Co. writes: "We have made some changes in our board of directors, also in the management, and expect to continue working the mines and putting on new improvements. We are not offering it for sale, although numerous brokers are seemingly trying to make it appear so. Our present board of directors are C. A. Burcham, R. L. Burcham, C. H. Mooers, John Singleton and Charles Wier. We expect to resume the regular payment of dividends next month."

LASSEN COUNTY.

Under the vigorous ownership of Benjamin & Meredith of San Francisco the old Golden Eagle property at Hayden Hill is showing increased wealth and is being developed into a valuable property.

LOS ANGELES COUNTY.

The Union Con. M. Co., Los Angeles,

owning the old Howard refinery, has spent \$100,000 in fitting up an oil refinery with five 200-barrel stills for manufacturing light oils and asphaltum.

MARIPOSA COUNTY.

The Austin and Dolph mines at Whitlock have been bought by T. R. Lombard of Coronado, Cal., and A. M. Kitchen of Chicago. At the Austin mine fifteen men will be put on. On the Dolph property Nevils & Hannah have a contract for 110 feet of shaft and drifts. D. A. Conolly of San Francisco is Supt.

NEVADA COUNTY.

(Special Correspondence).—Water to the amount of over 400 gallons a minute has for some time been handled by hoisting at the Central shaft, North Star mine. As this was beyond the capacity of the hoist in addition to other necessary hoisting, pumps are being made at the company's machine shops according to designs made by Assistant Supt. Sherman. A Dodd concentrator is installed at the mine. It is hoped by this means to save much fine auriferous material that has been lost in the past. Only fifteen stamps are being run at present, owing to inability to make desired savings.

Grass Valley, July 29.

On July 28, in the Federal Circuit Court, San Francisco, was rendered a decision involving \$600,000 of mining property in Grass Valley and vicinity. The suits were those of the Pennsylvania M. & M. Co. vs. the Grass Valley Exploration Co. There were two actions tried jointly. The first was an action in trespass instituted August 6, 1900, by the Pennsylvania Co. to recover the value of the ore extracted by the Grass Valley Co. from certain underground workings alleged by the Pennsylvania Co. to be in and upon their vein or lode. The second was an action in ejectment begun Feb. 16, 1900, by the Grass Valley Co. to recover possession of the lode described in the first action and embraced within the Pennsylvania underground working. The mining ground controversy is located in Grass Valley. The Pennsylvania Co. claimed the right to carry on mining operations in which it is engaged, based its claim upon the allegation that all underground workings are made in the regular pursuit of their mining operations in developing and extracting ore from and beneath the lode which is continuous from its apex at the surface and within the boundary claims of the Pennsylvania Co. to the lowest workings in the mine. By reason of this claim they claimed that title to this particular vein was in the Pennsylvania Co. no matter where it led to. The questions presented for determination were: The existence and continuity of the vein or lode apexing within surface boundaries of the property owned by the Pennsylvania Co. Continuity of apex of such and in the direction necessary to embrace within extended end lines planes the vein in controversy. The continuity and persistence of such vein or lode on its dip or downward course from its apex to the lowest point of the vein or lode as developed or worked by either party and including the ore described in dispute. The Pennsylvania Co. claimed it had an apex vein at or near the surface and within the boundary of its own property going beneath the claim of the Grass Valley Co. This position was denied by the Grass Valley Co. who declared that its opponent never had such a vein that did not cross both sides of its (Grass Valley's) location. The court is of the opinion that the evidence established the existence of the vein or lode apexing within the surface boundaries of the Pennsylvania Co.'s claim and that there is a continuity of apex of the vein or lode lengthwise the claim to the extent and in the direction necessary to embrace within its extent any claim or vein or lode in controversy. "In my mind," said Judge Morrow, "a most conclusive fact is established of the continuity of the Pennsylvania vein, and that it follows to the lowest workings of the mine beneath the surface claim of the Grass Valley Co. The Pennsylvania Co. has established its right to all ore beds and sections in the mine in controversy."

The case involves the W. Y. O. D. mine and several other large properties in the Grass Valley district. The opinion had been looked for by mining men for many months and the result will be immediate enlargement of operations by the Pennsylvania Co. By agreement the company receiving the decision is given the right to mine the disputed ground on the decision of the court, pending an appeal. The first case was referred to a referee or commissioner to be appointed by the court to take testimony and report as to the damage sustained by the Pennsylvania Co. by reason of the acts of the Grass Valley Co., and such further proceedings will thereupon be had as provided in the stipulation of April 17, 1901.

The Red Cross group, bought in March, is to be developed. Manager F. Enzens-

perger says a mill of adequate capacity will be erected. The Western Exploration Co. has with it in this enterprise C. I. Roder, manager Annie Laurie Co. Gold M. Co., Utah, and J. A. Brent, San Francisco. W. F. Snyder president, C. J. Roder vice-president, C. Ellingwood secretary and treasurer. Manager Enzensperger will make his headquarters at Nevada City.

The new compressor is in operation at the Gray Eagle mine, near Nevada City. A 10-stamp mill is on the ground and will be erected.

PLACER COUNTY.

(Special Correspondence).—For the use of the compressed air locomotive at the Red Point gravel mine, air is being compressed to 840 pounds by the three-stage compressor located below the mine. Almost the entire power for the compressor is derived from the mine water. Of the 70 cubic feet per minute coming from the mine, a part is used to wash the gravels, the remainder, in addition to running two ventilating blowers, runs the water wheel for the compressor.

Damascus, July 30.

G. W. Sackett is lessee Boston-South Dakota mine, Michigan Bluff.

The California mine at Shady Run employs thirty men.

The Summit mine, near Towle, reports fine prospects.

New machinery will be put in the Peckham Hill mine, near Spring Garden. The Bradley tunnel, at Black canyon, is in 100 feet.

PLUMAS COUNTY.

A. A. Osborn, treasurer Austrian S. & D. Co., has been examining mines at Genesee Valley and other points on the Plumas copper belt. He says a majority of the directors of his company were in favor of erecting a 40-ton smelter, but no official action has been taken.

The Plumas M. & S. Co. talk of a 10-stamp quartz mill on its group of mines in Genesee Valley.

SHASTA COUNTY.

The Unity Dredging Co. will dredge 300 acres on Dry creek, 12 miles southeast of Redding, and 2 miles from the Heintz property near Horsetown. L. Scrutton is manager.

There is a change in the site of the 125-ton smelter which the Great Western G. Co. is to build at Copley. The railroad's surveyors are running lines for the siding to the new site.

Assistant Supt. Anchor of the Bully Hill M. & S. Co. is developing a 30-foot vein that runs 20% copper, with silver and gold.

Bully Hill mines are 28 miles from Redding. A smelter is located near the mine. De Lamar township adjoins the smelter site on the east. South of De Lamar and south of the smelter is Sallee township. De Lamar and Sallee are separated by a gulch a few rods in width and virtually form one community. The residents of both places and the Bully Hill miners receive their mail at Winthrop postoffice, located in De Lamar. Copper City is 2½ miles south of De Lamar. The name of its postoffice is Ydalpomp.

SISKIYOU COUNTY.

(Special Correspondence).—In the Salmon river country the Yreka M. & M. Co. (Ball mine) has suspended work in Mountain Laurel and Golden Eagle claims; 6800 tons of ore were crushed from these two mines during the season, the average value about \$8 per ton; 150 tons of sulphurets were produced, which are being shipped to Selby for treatment.

The next season's run will be taken from the Ohio, Flora Blanche and Alda claims. A bucket tram will be put in to transport ore from these claims to the mill. The timbers are already cut and on the ground. The work of putting up the tram commences Aug. 10.

The Salmon River Co. have suspended work on the Myers claim, below Sawyer's Bar. Two giants and one elevator were used successfully and the company realized well from the season's cleanup. One more season's run can be made from this claim. The company are contemplating a move to Summerville on the south fork of Salmon river by the end of next season. It will be necessary to construct 8 miles of flume at a cost of about \$50,000, to carry sufficient water from the south fork to Summerville.

The Gold Run mine at Gilta is running full blast. Ten stamps are crushing ore steadily. The mine is so well opened up that only six miners are needed to keep the mill going. The ore is of a good grade and the property is paying well.

The King Solomon mine, near Cecilville, is running full handed. Six stamps and a Huntington mill are crushing the ore from the mine. Twenty-three men are employed at the mine and six at the mill.

Rollin, July 21.

Spengler Bros. have shut down in their claim, mouth of Humbug creek, water

very low. When the winter storms commence ground sluicing will be resumed.

Golden Quartz ledge, near Indian creek, owned by A. C. Brokaw & Co., will have a new steam hoist.

TRINITY COUNTY.

The Searchlight says there is a mine on Union creek, the ore from which is so rich that the miners are compelled to wash their hands and brush their clothes into a gold pan. The ore is a blue talc. The property is owned by Mr. Bill of San Francisco.

The Trinity County G. M. Co., in which Sweeney & Clendenning of Spokane, Wash., are interested, will have the new stamp mill in operation next month. Seventy-five men are at work. The mine is 20 miles from Dedrick—70 miles from a railroad. The nearest point is Redding.

At the Dorleska mine pumping and hoisting has been resumed.

Gulick & Sons are working the Blue Lead, Iowa and other claims. Mr. Payne of Trinity Center has bought the Russell & Maker claim, south of the Yellow Rose, and is sinking a shaft on the property.

At the junction of Union and Coffee creeks, the Nash hydraulic mine is running full handed on a bank of gravel. On Lower Coffee creek, Burner & Sons are taking out ore to be worked by the cyanide process by the Golden Jubilee M. & M. Co.—The Golden Jubilee is running; the mill and cyanide plants are being worked to full capacity.

TUOLUMNE COUNTY.

Near Columbia, the Keltz mine and mill are in operation. Twenty men are employed at the Mountain Lily mine. The mill is running in the daytime.

Carters New Era reports five houses being built at the Shawmut mine and 100 stamps dropping.

T. F. McAvoy of Alameda and A. White of Vallejo now own the Hardtack mine. The latter recently carried out the bond taken from Sears & Summers for one-half interest; price \$10,000. Both owners have deeded their property to the Hardtack M. Co.

The Msjor's claim, near Blanket creek, has been bonded to L. G. Harrison for \$13,000—\$3000 down.

In the Mt. Jefferson mine, near Groveland, the shoot of ore has widened out to 20 inches 85 feet below the 300-foot level. Free-milling ore runs to \$286.40 and sulphurets \$273 to the ton, making over \$500. The ledge is over 30 feet wide, averaging \$8 a ton.

Supt. Smith of the Sunnyside is working seventeen men.

The Confidence mine started its first machine drill last week.

COLORADO.

BOULDER COUNTY.

The new Wall Street mill will begin next month, to be run entirely on low-grade ore—\$3 per ton.

Mrs. T. Haig of Topeka, Kan., has bought the Puzzler mine and twelve claims adjoining it, near Puzzler, for \$10,000. One tunnel will be run this summer which will cut all the claims.

CHAFFEE COUNTY.

The Florence-Elmo M. Co., at Buena Vista, will be further developed.

CLEAR CREEK COUNTY.

Idaho Springs reports a deal of great importance. The International M. Co. has bought the Weldon group and the Fairmount mine \$60,000 and \$80,000 respectively having been paid. The new owners will group the two properties and develop them. The International M. Co. is a Boston corporation, head offices in Waterbury, Vt., the home of the president, G. E. Moody. The new company has a right of way through the Mixsell tunnel.

Near Silver Plume, the Corry City group, now owned by a Baltimore company, under the management of C. D. Desch, is under examination by a Philadelphia company. In case of purchase they propose to drive a long tunnel to cut these lodes 1000 feet deeper; also to erect a large mill.

The Terrible group has resumed operations. The tunnel is being retimbered, old buildings repaired, and when that work is completed a plant of machinery will be installed. The electric drills at the Scott tunnel are at work. A 12 H. P. oil engine drives the dynamo that generates the electric current. A suction fan removes the smoke and gas from the tunnel after shooting.

The Republic Con. M. Co. has started work on the Commonwealth mine, at Dumont, through a crosscut tunnel to connect with the bottom of the old shaft and greatly facilitate the operation of the mine.

Idaho Springs reports the probable consolidation of the John Owen M. & M. Co. and the Gem Extension, W. E. Renshaw of the Gem property to be manager of the new company.

CUSTER COUNTY.

The Custer M. & R. Co. has a bond and lease on the Maverick mine, between Custer City and Rosita. Ore has been uncovered in the Maverick which runs \$257 in silver. Considerable money will be spent in improving the property.

The Bassick mine is enlarging the capacity of its mill from 75 to 125 tons a day; rollers and crushers going in at the new deep shaft, where the ore is delivered and crushed and then conveyed by water force in sluice boxes to the mill, located 500 feet distant; this method of transmitting the ore is used for the first time in that part of the State. The main shaft is down 1580 feet and will be put to 1680 feet, where new levels will be run out and considerable development work done to explore the big ore chimneys of this mine at that depth.

The Terrible mine, 15 miles northeast of Silver Cliff, has been leased by Gray & Baker, who are making a concentrate of the cerussite or crystalline lead ore which abounds on that property. When the concentrate is reduced to a litharge by furnaces at the mine it sells at \$120 a ton f. o. b. in car lots at Florence. This litharge vulcanizes 20% more rubber than ordinary litharge.

On the Hector a body of cyaniding ore has been uncovered at a depth of 200 feet.

The Bull Domingo, near Silver Cliff, has been unwatered to a depth of 950 feet by the Neptune Co.

DOLORES COUNTY.

(Special Correspondence).—The Emma G. M. Co., at Dutton, have a 125-ton mill and have in use a ball mill, eighteen concentrators, a 100 H. P. marine boiler and 175 H. P. duplex engine. They are doing the work through four tunnels and have done about 6000 feet of development work. They employ eighty men; Richard Keller is manager.

The Mt. Gorham M. Co. is operating a 10-stamp mill, employing twenty-five men.

Development work is being pushed on the America group, B. & M. and Free Coinage mine. The value of the ores in the district averages about 65% gold, about 35% silver and will concentrate about twenty tons into one.

Rico, July 24.

EL PASO COUNTY.

A cyanide mill, to treat low-grade ores from the Cripple Creek district, is to be erected at Colorado City, where R. M. Shearer represents the company.

GILPIN COUNTY.

The Calumet G. M. Co., Russell Gulch, has closed down indefinitely. Central City, July 27.

During the third week of last month the shipments of smelting and crude ores, tailings and concentrates from the Black Hawk depot to the Denver and Golden smelters and outside points of treatment were 115 cars—2230 tons. For the first three weeks of that month the shipments were 313 cars—6260 tons.

GUNNISON COUNTY.

The Good Hope M. & R. Co. are installing their new 100 H. P. boiler. They intend sinking their shaft 200 feet deeper. Vulcan, July 27.

HINSDALE COUNTY.

(Special Correspondence).—The Henson Lead Co., Lake City, have a power plant and pipe line similar to the Red Rover M. Co. They are using electric drills in their mine and are excavating for a 100-ton concentrating mill to be completed before winter.

The Hanna property at Capital City is starting its 100-ton mill and will build an aerial tramway about three-fourths of a mile in length.

A great deal of prospecting and development work is going on up Henson creek, near Lake City. There are more permanent improvements now going on around Lake City than for the past five years.

The Auric M. Co., operating the Ute & Ulay mine at Lake City, are going to sink a deep shaft to cut the mine at a greater depth than at which it has ever been worked. They expect to erect a new mill at once. The ore is lead concentrates. They are shipping fifteen tons of concentrates per day, employing about 100 men. J. J. Duffey is superintendent of mine and J. Bamhrough superintendent of mill.

The Hidden Treasure M. & T. Co., Lake City, have closed down temporarily for repairs. They expect to be running full handed by August 15th. They employ 100 men when operating and expect to drive a crosscut tunnel 4000 feet in length.

The Tohasco M. & M. Co., Lake City, are building an aerial tramway and a 100-ton concentrating and pneumatic cyanide mill.

Lake City, July 25.

S. D. Nicholson, manager Auric M. Co., operating the Ute & Ulay mine on Henson creek, says he will sink a new shaft 1200 feet. It will be 4½x15 feet in the

clear. The company will also build a new mill.

The Dupre Co. has opened a vein in the Isolda claim, Burrows park; pay streak, 20 inches wide, runs sixty ounces gold.

LAKE COUNTY.

Near Leadville the Fanchon mine is hoisting three tons of ore daily sufficient to pay expenses of development work. Ore runs fifty to seventy ounces in silver to the ton; net profits above smelting charges about \$25 per ton.

Supt. Henley of the Elkton says the pumping being done in the eighth level is costing about \$7500 a month and is making little impression on the water situation generally. The Elkton Co. think other Leadville mines should come in and share the cost of pumping. An effort will be made in this direction, after which, if co-operation is not secured, the Elkton will be forced to shut down its eighth level.

Jas. Shinn, manager Stormy Petrel M. Co., will resume work on the property near Leadville. The ore is largely an oxidized lead.

Manager C. T. Carnahan of the Resurrection M. Co. expects to have the new concentrating mill finished Nov. 15th. He thinks that, for separating iron and zinc, the Wetherell process of magnetic treatment meets all requirements of the situation.

The Colorado Fuel & Iron Co. has bought 2000 acres, Sugar Loaf reservoir, in Lake Park, will build a reservoir, a dam 1000 feet long, 40 feet high, capacity of 1000 million cubic feet water.

At Leadville, the A. Y. & Minnie has 250 light electric motor for its new mill and mine. The company expects to start up next week.

F. Bergber of the Weldon mine has organized a company to run a tunnel into Sugar Loaf mountain, tapping the veins at a depth of 900 feet below the Dinero vein. The estimated cost of the tunnel is \$35,000.

LA PLATA COUNTY.

(Special Correspondence).—The Ruby King mine, in the Oro Fino district, is doing a large amount of development work on their properties. A good deal of work is also being done on the Buffalo. Some rich ore is being sent direct to the smelters from this district.

Durango, July 24.

OURAY COUNTY.

(Special Correspondence).—The Atlas mine, in the Sneffels district, under bond and lease, is taking out considerable ore and doing development work. They have about 1300 feet of tunnel work; have already cut the parallel vein, and have a drift 160 feet on the Atlas vein crosscut; have drifted 1000 feet on the vein and struck some high-grade ore.

The Camp Bird Extension M. Co. is running a drift on the Monument vein, and, now in 1250 feet, expect to cut the Camp Bird vein 800 feet farther. Work is all being done under contract. The same company is also opening up the Hoosier Girl vein near the angle station of the Camp Bird tramway. Some very rich silver ore was shipped out of this mine in the early days.

The Morning Star, in Poughkeepsie gulch, across from the Gold Klog, which has been worked in a small way for the last twenty years, is being operated by the owner, C. Anderson, and shows a streak of high-grade ore, carrying gold and lead. This property adjoins the Alaska, owned by the Tahor estate, and in the early days shipped 3000 ounces of silver ore.

The Home Pyritic Smelting Co. of Ouray expect to commence purchasing ore Aug. 10 and to start the smelter by Aug. 15. They are putting the smelter in shape for running, as well as erecting some new houses.

The Saratoga smelter, at Ironton, is preparing to start work. The directors are here from the East; they intend building a railroad from Red Mountain to the smelter, 3 miles. They hope to have the smelter running in thirty days.

Loughlin & Hobson of Ouray have a lease on the Old Lout mine, in Poughkeepsie gulch, and intend to start shipping ore.

Ouray, July 22.

(Special Correspondence).—The Revenue Tunnel M. Co. at Sneffels expect to have their cyanide mill in operation in one month. They have about 150 men employed and are taking out three cars of ore per day.

Sneffels, July 26.

SAGUACHE COUNTY.

At Florence the Steel Canyon M. & M. Co. has been organized to work mining property near Orient and will erect a 40-ton matting smelter.

(Special Correspondence).—There is considerable work being done in the vicinity of Mineral Point, owing perhaps to the discovery of rich ore in Burro Park. This

is an old district, having been prospected in the early '70s; but, owing to the high transportation charges and short season, work was practically abandoned. Work was resumed last month on the Early Bird property, between Animas Forks and Mineral Point, by Thistle & Neely of Ouray, which has produced eleven carloads of ore from a drift 240 feet on the vein, without stoping. This ore gave net smelter returns of \$6500, or an average of \$60 per ton net to the owner, O. S. Olsen, who became discouraged when the values played out in the last 10 feet of his work, and he leased the property to Thistle & Neely, who carried the drift only 5 feet farther and opened up a rich ore shoot. The vein at this point is 3 feet wide; ore shoot, 18 inches. The average value of the pay streak shows 4.2 ounces gold, 256 ounces silver and 6% copper. The finding of this rich ore has stimulated the owners of other properties in the vicinity and a good deal of work is going on there. Just across from the Early Bird, Davis & Downer are working the Mammoth mine under lease and are taking out some good ore.

Silverton, July 21.

(Special Correspondence).—The Tomboy mine mill is running steadily. The company is making progress with their new mill, baving the timbers and framework completed and inclosing begun. All the material for the mill has to be packed upon mules and wagons. They have started work on the new wagon road from Telluride to the Tomboy mines, which will be a great improvement over the present trail when completed. It will be several months before the road will be ready for use.

The Smuggler-Union M. Co.'s mills are now being operated by water power from Bridal Veil Falls utilizing this stream under a head of 1218 feet, developing power sufficient for the entire needs of the property—about 700 H. P. They are operating 140 stamps in two mills—one mill sixty and the other eighty stamps—and a cyanide plant, capacity 500 tons per day, and are milling 550 tons per day. There are about 400 men employed at the mine.

The Ophir Con. Mines Co., at Ophir, is probably the only mill in the State of Colorado driven direct from motors to cam shaft without line or countershaft. They now have twenty stamps and are putting in thirty more. They are handling 100 tons of ore daily; when the new mill is completed they will handle 175 tons. W. S. Buckley states they are handling a carload of concentrates daily. Ores average about \$50 per ton. They have a new compressor plant and are running all of their drifts with machine drills. As soon as they get the mill completed and running, it is the intention of Manager Buckley to start building another 50-stamp mill in addition to the one they now have, making a 100-ton mill.

Telluride, July 28.

Silverton reports that the International Reduction Co., as represented by C. H. Gage of Denver and J. F. Cullen of Pittsburgh, Pa., has bought the Galtby Boy group of claims for \$40,000. The new owners say they will erect a plant suitable for the reduction of the ores.

SUMMIT COUNTY.

The American Gold Dredging Co., in Swan valley, is operating the dredger and sluicing at the mouth of Galena gulch.

The Gold Pan Placer Co. is pushing its pit for the bedrock. A rotary pump has been placed in the pit 65 feet below the river level to handle the heavy inflow of water. The 3-foot wide rubber belt conveyor to remove the tailings from the double elevated flume, in which the gold gravel is washed, is about finished, and will provide dumping facilities.

A gold nugget is reported found by Manager Dyar of the American G. D. Co., worth \$499.82. The same placer produced a nugget last month worth \$128. The Cashier mine, near Breckenridge, has decided to put in twenty more stamps, doubling the capacity of the mill. T. L. Wood, of Denver, is manager.

TELLER COUNTY.

The Central Consolidated Co., Cripple Creek, proposes putting in an entire new and larger plant of hoisting machinery on its Happy Year claim, on Raven hill.

The Cripple Creek M. Co., lessee of the Hull City Placer, has resumed sinking from the 1100 foot station of the main shaft.

The Cripple Creek Times says: "Tired of pumping water of the district and bearing the entire expense, the board of directors of the Elkton Consolidated Co. has decided to close the eighth level of the mine and keep it closed. The level will be closed just as soon as they are able to get out the ore that is already broken there. The board of directors would be willing to keep the level open and continue pumping if the other mines would be agreeable to sharing the heavy expense of running the pumps. During the

past year or more the Elkton has been drafting the entire district of the water. They have tired of it and do not intend doing so longer."

Near Victor \$1,000,000 damages is asked by the Morning Glory G. M. Co. against the Mary McKinney M. Co., and a temporary injunction restraining the latter from further work on the Alleen lode claim is prayed for. The Alleen lode and the Republic lode are contiguous mining claims owned by the respective companies in the Cripple Creek mining district. The Morning Glory Co. claims that the defendant company entered upon the Alleen claim by "force of arms" on January 1, 1899; that it has since retained possession of the property and did sell and convert to its own use large amounts of valuable gold and silver-bearing ores, to the amount and extent of not less than \$1,000,000. Warren Woods is president of the Morning Glory Co.

IDAHO.

ADA COUNTY.

The New Century G. M. Co. has made its last payment on the Sunbeam and Sunshine claims, Neal district, 20 miles from Boise—the completion of the purchase price of \$16,000. The company is composed of New York men and is represented in Boise by A. C. Fralik and W. L. Grose, who have conducted the development work on the property since the purchase.

IDAHO COUNTY.

Grangeville reports \$1600 gold as the product of the first twelve days' run of the Crackerjack mill; \$20 a ton is lost in the sluices, which can not be taken up on the plates. The sluices can be cyanided for \$2 a ton, and the company will put in a cyanide plant. The concentrates carry \$5 a ton. A crusher is to be added.

Warren is reported lively. There are twenty-five men working in the Silver King mine, twenty in the Rescue and sixteen in the Little Ben property.

General Manager F. M. Kirkpatrick of the Thunder Mountain Con. G. M. Co. says he will put a 5-stamp mill on the company's property, Thunder Mountain district, adjoining the Belle of Thunder Mountain Co.

At Weiser W. J. Finn, from Marshall Lake, reports that the owners of the Jewel group have a stamp mill which is cleaning up \$30 per ton. Marshall Lake is 90 miles from Council, the terminus of the Pacific & Idaho Northern Railroad. The ore is free milling.

SHOSHONE COUNTY.

C. Sweeney is locally credited in Wallace with having bought the Wyoming mine and a controlling interest in the Black Hawk. The price named is \$225,000.

The Hercules M. Co., at Wallace, propose putting in machinery.

At Mullan, A. M. Strode, manager Reindeer mine, says he has a 2-foot vein of 20% copper ore.

D. A. Hyman, president Frisco Con. M. Co., expects work will start again September 1 on the Frisco at Gem.

The Intermountain Mines Co. has incorporated at Spokane, Wash., to operate near Wallace.

Before the assessment board Manager Ehrenberg of the Helena-Frisco testified that the Helena-Frisco lost 16 cents per ton on all its output in 1900. Manager Burch stated that 43.3% of the ore taken from the Bunker Hill & Sullivan was taken from the Stewiander claim, an unpatented property not assessable and that in a great measure accounted for the \$21,000 a month paid in dividends and the capitalization of the property. Mr. Doherty, on behalf of the Cœur d'Alene M. Co., a placer property on the Murray side, declared under oath that the \$15,000 in gold extracted from that property last year cost the company \$16,000 to produce. The board reduced the assessment \$25,000.

MICHIGAN.

HOUGHTON COUNTY.

In his report of the Calumet & Hecla for the fiscal year ended April 30, President A. Agassiz says: "During the past year we produced mineral equal to 42,462 tons of refined copper, as against 37,932 tons last year. (This small production was due to the fire at the mine of that year.) Our product in refined copper was 39,982 tons. For the previous year our product in refined copper was 36,326 tons. The price of copper has varied from 16½ to 11 cents per pound, and is now about 12½ cents. During no year, perhaps, in the history of the mine has so large an equipment been added by the company as during the past year. At the Lake Linden smelting works five large-size furnaces have been rebuilt. This change will result in considerable economy in smelting. At the Buffalo smelting works the new electrolytic plant has been completed and a new wharf has been built. We have made some successful experiments with a

full-sized model of a Kimberley hoist. It is proposed to install such a hoist at the Red Jacket shaft during the coming year. Interesting experiments are making with our waste sands, which, it is hoped, may lead to a marked saving of the wastes of our mills."

MONTANA.

GRANITE COUNTY.

The Granito-Bimetallic Con. M. Co. shipped twenty-six bars of silver bullion from Phillipsburg last week.

MADISON COUNTY.

W. F. Odin of Sheridan is building a 5-stamp mill to treat the product of his mine.

F. Wright, Supt. Montana M. Co., operating a group of mines at the head of Wisconsin creek, near Virginia City, has a mill which treats fifteen tons of ore every twenty-four hours.

MEACHER COUNTY.

The copper mine near Copperopolis is unwatered and sinking is progressing.

MISSOULA COUNTY.

At Saltese the Monitor is employing thirty men. Howard Walsh owner, J. Cooley foreman.

The Tarbox has hoisting machinery capable of sinking 500 feet. The vein has a width of 18 feet.

Ten men are at work on the Garrison claim.

PARK COUNTY.

Application has been made by stockholders of the Bear Gulch M. Co. asking that a receiver be appointed to take charge of the company's property at Jardine.

SILVER BOW COUNTY.

F. A. Heinze's mines in Butte are reported to be at present producing copper at the rate of 3,550,000 pounds a month, divided between his three principal properties as follows: Rarus, 1,500,000 pounds; Minnie Healey, 1,300,000; Corra, 750,000.

NEVADA.

ESMERALDA COUNTY.

Men will develop the property of the Con. Esmeralda M. Co., Hawthorne district, under the superintendency of R. K. Colcord.

LINCOLN COUNTY.

During the month the Quartette Co. milled 800 tons of ore, which netted \$23 per ton. The total cost of mining, transportation over 16 miles of railroad and milling was \$3.60 per ton. The railroad is now making two trips a day and hauling about seventy tons daily to the mill.

NYE COUNTY.

At the mines in and around Tonopah are ten gas engines and hoists and two steam engines varying from 10 to 32 H. P. There are ten whirls in operation.

Tonopah reports that the recent demand for men is supplied. "Stages are crowded and the town is full of idle men."

Messrs. Leonard & Taylor of San Francisco say they will put in a plant to treat the ores of Tonopah that will not stand the long wagon and railroad hauls to market. They have contracts for 20,000 tons of ore as a starter. Over 250 teams are now employed in the freighting business between Tonopah and the railroad. The stage line is running three coaches daily.

C. Mau, one of the original locators of the Pactolus mines, 35 miles east of Luning, says supplies are expensive and water cannot be obtained for \$5 a barrel. The ore is in stringers pitching into a porphyry dike. The country has been staked for miles around.

STOREY COUNTY.

At Virginia wiring the Caledonia for electric power is completed and motors placed for running a blower on the 1100 and 1000 levels, the power for which will be carried down the shaft in a six-ton lead cable. The 1100 level will be the distributing point from which wires will be run to the various workings in that vicinity for light, etc. The new system will dispense with the air pipe in the shaft.

WASHOE COUNTY.

H. D. Ramsey has gold-bearing ore at a depth of 100 feet in the Tally-Ho mine, Wedekind district, that assays \$300 per ton. A new postoffice has been established at Wedekind.

WHITE PINE COUNTY.

The Bell Mare M. & S. Co. and the Nevada Copper Co. have consolidated as the Nevada Belle C. M. & S. Co. The new company owns 500 acres and is supplied with machinery, surface improvements and a 50-ton copper matte smelter, the latter on the property of the Nevada Copper Co. The new plan of development contemplates running a 1000 foot tunnel to the Copper King ledge, the principal copper deposit on the Bell Mare. C. W. Sweltzer of Reno is president.

NEW MEXICO.

The Abbey M. Co. of Pittsburgh is operating at Abbey, Socorro county; Upham, Sierra county, and Rincon, Dona Ana county. The Abbey group is 25 miles north of Magdalena. The Washington group is in Sierra county, 10 miles from Upham station. There are four claims in this group. The vein is from 100 to 150 feet in width, capped with iron, through which copper stringers are protruding, assaying 20%. The Manganese group is in Dona Ana county, 1 mile from Rincon. There are twenty-eight claims, stretching for 8 miles along a continuous vein, apparently making it the largest manganese property in the world.

OREGON.

BAKER COUNTY.

Manager J. A. Hilliker of the Western Union M. & D. Co., will drive on the Blaine and Monte Cristo, near Sumpter.

Near Sumpter, the Cougar management has improved methods of treating the ores—finer crushing, previous to cyaniding, being the principal change.

It is locally stated that a large stamp mill is to be put on the Friday group, near Baker City, by Manager F. E. Wilson.

The Psyche mine, Greenhorn district, owned by J. Fawcett, will have a 10-stamp mill. The tunnel is in 250 feet and will be continued 600 feet.

L. V. Swiggett of Sumpter has sold the Orleans quartz mine to E. H. Emery of Baker City.

The Valley Queen G. M. Co. has incorporated at Sumpter by T. Gray, C. S. Warren and C. H. McColloch.

From Baker City Z. C. Houser of the Standard mine will send five tons of copper and gold ore that will average \$100 to the ton to Germany for permanent exhibit of the mineral wealth of eastern Oregon.

Placer mining on the Snake river is reported profitable in some places this season. On Sturgill bar, owned by Reed, Bobinette & Co., the gold is very coarse. The clean-up for the season is estimated at \$10,000.

Operations are to be resumed on the Diadem mine, near Sumpter.

GRANT COUNTY.

The first carload of concentrates from the Badger mine, Susanville, has been sent to the smelter.

JOSEPHINE COUNTY.

Operations at the Oregon Bonanza, Williams creek, have been suspended. Supt. Rogers is in San Francisco to consult with the company.

Machinery at the Granite Hill mines, Louse Creek district, is in operation. The properties are being developed. The quartz is giving returns of \$26 per ton. The Red Jacket mine is opened to a depth of 300 feet. The Granite Hill M. Co. owns 500 acres of mineral land; 240 acres of this is placer land. The company operates a large hydraulic mine. The company expects to put in an extensive plant and work the group of mines as one big quartz property.

MALHEUR COUNTY.

Minnesota people have bought the porphyry dyke near Malheur City and will put in a 20-stamp mill. The ground prospects about \$3 per ton.

SOUTH DAKOTA.

CUSTER COUNTY.

The North Star mine, at Custer, is down 350 feet; a plant will be built to treat the ore.

LAWRENCE COUNTY.

The Kildonan chlorination mill at Pluma will be converted into a combination smelter, cyanide and chlorination mill.

J. Madill, former Supt. American M. Co., is now working mines of his own at Ragged Top.

PENNINGTON COUNTY.

The Horseshoe Co. is negotiating for the National smelter at Rapid City.

UTAH.

BEAVER COUNTY.

The Majestic Co.'s smelter will probably be located at Tadpole Springs, 3 miles south of Milford.

IRON COUNTY.

P. L. Kimberley and F. H. Buhl of Sharon, Pa., have bought the iron deposits on Iron mountain from Walker Bros., Cullen & Campbell for \$225,000.

JUAB COUNTY.

The Orient M. Co., West Tintic, say that, while tests show the cyanide process would make possible 92% gold extraction, they will not build a mill till 60,000 tons ore are in sight. The ore averages \$8 per ton.

SUMMIT COUNTY.

The Park City Record reports regarding the Daly West that the last of the

wreckage from the explosion is cleared away and the property again working in its customary way, putting out the usual tonnage. The noxious gases are all out of the mine and ore is issuing from the tunnel mouth in the usual quantities. No material damage was done to the mine proper by the explosion.

The California mine has started work again. Foreman Getsch has twenty men stopping and running a raise from the lower tunnel to intermediate workings. Extensive work is mapped out.

The immediate enlargement of the Anchor concentrator at Park City will be to a capacity that will enable it to treat 300 tons daily.

TOOELE COUNTY.

The Black Diamond property at Stockton is to be developed under the management of J. Dederichs. Samples of galena have yielded 60% lead, twenty-five ounces of silver and \$3 gold to the ton.

The Ensign G. M. & M. Co. has resumed development work on its Pine Canyon properties.

A fire in the shaft house of the Honerine mine at Stockton, July 28, did damage to the estimated amount of \$50,000, destroying the shaft house, boiler house, four 100 H. P. engines and timbers in the shaft to a depth of nearly 100 feet. The origin of the fire is not known. The machinery destroyed had not been running for several weeks, the plant having been shut down prior to beginning work on the tunnel. The property destroyed was fully covered by insurance and will be immediately replaced.

WASHINGTON COUNTY.

Manager T. Ferguson at Silver Reef will place a cyanide plant to leach the tailings. He has a lease on the Barbee, Christie and Leeds tailings dumps—400,000 tons. The mill will be of 100 tons daily capacity, to be in operation Oct. 1st.

WASHINGTON.

FERRY COUNTY.

(Special Correspondence)—Rich ore is being taken from the granite belt, south of the Agency. The Apache people are sacking ore for shipment to the smelter. It is brittle silver ore charged with iron pyrites, which latter carries gold values. A test of the shipment being sacked gave \$1400 silver and \$200 gold. East, and on the same vein, the Double Header and Little Chief show the same ore—brittle and ruby silver, with the same yellow iron sulphide rich in gold. Several other claims in the same belt, notably the Combination and Hattie D., are taking out the same class of ore. The new river steamer, the Chelan, will soon be making regular trips from Wenatchee, and preparations are being made to take advantage of the new transportation via the Great Northern road from Wenatchee to the coast smelters.

Lakeside, July 21.

From Republic four cars of ore were shipped to the Granhy smelter last week from the Lone Pine-Surprise. Supt. Creasor has not yet received smelter samples.—The California mine has shipped seventeen cars of ore to the smelter at Nelson.—The Morning Glory is driving an adit tunnel.

LINCOLN COUNTY.

Near Davenport, Manager H. J. Davis of the Turk M. & M. Co. says it is the company's intention to build a smelter to treat the ore at the mine. The smelter will be built on Cedar creek, 1 mile below the Turk mine.

WYOMING.

CARBON COUNTY.

At Grand Encampment the North American Copper Co.'s option on the Ferris-Haggerty mine will expire Aug. 15.

UINTA COUNTY.

At Cheyenne the Edison Electric Co. is incorporated to establish a power and light plant in the vicinity of Evanston, in the Uinta oil field, to furnish light and power to the towns that are expected to spring into existence as a result of the predicted oil boom there. A Cooke has charge.

FOREIGN.

BRITISH COLUMBIA.

E. G. Prior, Minister of Mines of the Province of British Columbia, in his annual report for the year ending December 31, 1901, shows that the gold production of the Province—including both placer and lode gold—for the past year was of value of \$5,318,703, the greatest gold production British Columbia has ever made. This production is derived from placer mining, including ordinary placer work, hydraulicking and dredging, and from lode mining.

Placer mining is of necessity dependent on the weather, says the report, and is as variable in this Province as that commodity, but in lode gold mining, as the

mines develop, the production becomes as regular as the output of a manufacturing business, and it is to lode mining that the Province is indebted for its ever increasing gold production. In 1901 the lode mines of the Province produced \$4,348,603 in value of gold. The increase is due to the development of the Boundary district. The increased tonnage of the Rossland and Nelson districts has also had its effect. Approximately this gold has been derived from: Direct smelting of copper-gold ores \$3,474,738, combined amalgamation and concentration \$873,865, total \$4,348,603. It may be said that no absolutely free milling gold property is working in the Province. They all carry sufficient values in sulphides to necessitate the saving of such.

The total amount of silver production in 1901 was 5,151,333 ounces, valued at \$2,884,745. Silver is derived from silver-lead ores and from copper ores carrying silver, with a small percentage of dry silver ores. In 1900 approximately 90% of the silver produced was derived from silver-lead ores, probably including most of the dry ores, as they were chiefly smelted together and are impossible to separate in the statistics. This year there has been a falling off in the production of lead ores, and a consequent diminution of the silver production, which has, however, been more than offset by the greatly increased tonnage of the copper-silver ores.

As near as can be estimated, the copper-silver ores have this year produced 301% of the silver output. The production of dry ores, although proportionately small, has increased.

The production of lead the past year was 51,582,906 pounds, worth \$2,002,733, a decrease in value of \$689,154, or about 25% as compared with the production of 1900, but in 1900 there was a phenomenal increase over 1899 of 206%. The figures show, therefore, that the lead production in 1901, although showing a decrease as compared with 1900, shows an increase over 1898 of 86% and over 1899 of 128%, and is still 25% higher than the highest production of any year prior to 1900. The cause of the decrease is not attributable to the mines themselves, but to the condition of the market for lead ores—too large a question to go into here—which has temporarily rendered it unprofitable to mine large bodies of galena very low in silver. Reference is here made particularly to the lead ores of East Kootenay. The Slocan district has not been so seriously affected by the low price obtained for lead ores, as the ores of that section carry much higher silver values, which has enabled them to be mined and marketed at a profit. As a matter of fact, the Slocan has this year just held its own as regards tonnage of ore mined and values produced.

Each year seems to present some particular feature of interest, and this year it is the greatly increased copper production of the Province. The production for the year has been 27,603,746 pounds of fine copper, valued at \$4,446,963, an increase of 17,606,666 pounds and \$2,831,674 over that of the previous year, or about 175% increase in value. It may here be noted that the recent break in the copper market did not occur until the last month of the year, and, as in estimating the values as above the average price for the year is employed, the value of the product has not been seriously affected. This copper has been derived as follows:

Districts.	Pounds.
Boundary.....	14,511,787
Trail-Rossland.....	8,335,446
Coast.....	3,115,872
Nelson.....	1,599,449
Other districts.....	43,192

Total.....27,603,746

It has to be recorded that as yet very little iron ore as such has been mined in the Province. There have been a few experimental shipments made and a considerable amount of development work carried on, but from the very nature of things iron ore to be handled at all necessitates an iron blast furnace to treat it, which is not as yet an accomplished fact in British Columbia, and will not be until sufficient development has been done to fully establish both the quantity and quality of the ore supply to justify its erection. The statistics show that 5746 tons of ore were shipped, which, as before stated, were used for experimental purposes or as a flux in smelting other ores.

Manager Clermont Livingstone of the Tye mine, Mount Sicker, is hocking out ore. The aerial tramway to convey the ore from the mine to the E. & N. track at Somenos, 4 miles, whence it will be shipped over the E. & N. to Ladysmith, will be completed August 15. Work on the Tye smelter at Ladysmith is progressing. Fifty men are employed at the mine, forty on the tramway and forty at the smelter.

At Nelson work at the Granite-Poor-man mill is to be resumed. Plans for an

addition of twenty stamps to the present 20-stamp mill are being prepared.

The Referendum mine, near Nelson, will set up its 5-stamp mill and begin treatment of ore.

The Ward Horsefly Co. is the only mining company now working at Harper's Camp. Manager Ward is working the ground made available by turning the course of the river. The hydraulic elevator is lifting 52 feet. A part of the ground is shovelled into boxes and is paying.

Manager M. Bailey of the Cariboo Gold Fields Co. has a circular pit about 250x350 feet and 70 feet from the top to bedrock. The top layers of dirt, from 10 to 15 feet thick, is the gravel washed down the creek by pioneer miners. The work in the pit is carried on as it would be in any hydraulic mine, up to the point of disposing of the gravel after it has run through the sluice boxes. It is in these sluice boxes that most of the gold is caught. After the dirt leaves the sluice boxes it falls into a reservoir and is elevated to the surface, passes over grizzlies and through a revolving screen, and is then carried in sluices to the nearest low ground. The elevator buckets are run fifteen to the minute, and in twenty-four hours lift about 2400 cubic yards. A 24-inch wheel, fed by an 8-inch pipe under a 500-foot head, is the motive power.

The Similkameen Star has a report from McRae Bros., who have returns on samples of ore from the Hamilton claim sent to Baker & Co. of Newark, N. J., to be assayed for platinum. The samples ran 60 ounces per ton in platinum, 1.12 ounce gold and 28% copper.

Greenwood reports that neither the British Columbia Copper Co.'s smelter at that place nor the Sunset smelter, 3 miles below, has been running for three weeks. Since the strike at Fernie no coke has been regularly furnished by the Crow's Nest Pass Coal Co., and as soon as the reserve of coke at the smelters was exhausted they were compelled to close down. The Granhy Co. has succeeded in getting coke from Fernie, Michel and also from the more recently opened up coal mines at Frank.

INDIA.

The Cauvery Falls electrical power transmission works in India, which have taken two years to construct, will be in operation next month. The plant is designed to generate 4500 H. P. for transmission 95 miles to the Kolar gold fields, where it will be distributed among ten gold mines, the best known of which are Mysore, Ooregum, Nuudydroog, and Champion Reef. The transmission line, consisting of telegraph posts carrying six strands of copper wire, runs through hilly jungles infested by tigers and panthers. The nearest railway station to the power station is 30 miles distant. Tame elephants were requisitioned to help convey the machinery from the railway.

KOREA.

H. F. Meserve, general manager L. S. J. Hunt's mines in Korea, 300 miles from Seoul, the capital of Korea, has concessions from the Government covering 25 square miles. The rock is gold bearing quartz. At present he is operating 120 stamps on the property and two cyanide tanks, and are now building an 80-stamp mill—200 stamps in all. The product is shipped to Japan in the form of gold bars. The company employs 7000 miners, including about eighty Americans. The others are Koreans, Japanese and Chinese. The Asiatics receive 25 cents in gold or 50 cents silver money per day, on which they live well. The Americans are over-eers.

MEXICO.

The La Luz Mines Co. of Guanajuato propose to build a mill and expect to be ready to begin Nov. 1st.

The Guanajuato Con.'s new 60-stamp mill will be in operation next week and will handle 200 tons daily.

The principal part of the Mexican quicksilver is mined at Huitzoco, State of Guerrero—Mina Cruz y Anexas. This mine has been worked since 1874 and is producing 3500 tons ore each month, from which 230 flasks of quicksilver are made. The work of extracting is simple and primitive. After the mineral is broken off in pieces weighing five or six pounds, it is roasted in specially constructed ovens. The smoke and steam are caught in a vast chamber where the quicksilver is precipitated, mixed with the soot and other solid substances. Once a month this deposit is gathered and collected on sheets of iron and inclined to a certain angle. This substance is revolved slowly, the quicksilver is separated and precipitated to the bottom, from which it falls into an iron boiler. From this it is drawn off into flasks.

President Hine of the Guanajuato Power & Electric Co., after a careful study of the conditions prevailing there—a combination of the two factors of cheap power and the cheap milling of Guanajuato ores (at a

cost of \$2.25 gold per ton, with a recovery of from 80% to 90% of the hullion content)—says that he believes the production of the next fifty years will be greater than it has been during the past three centuries.

SONORA.

Manager Murray of the Sublate mine says the 10-mile water pipe line which is being built from Agujito to the mines will be completed August 15.

Personal.

A. A. VERNON is manager Big Four mine, Ymir, B. C.

H. B. MAXSON of Reno, Nev., is visiting San Francisco.

T. C. GRAY is now Supt. Valley Queen mine, Sumpter, Or.

WM. CAMERON is Supt. Occidental mine, Iowa Hill, Cal.

THOS. BOTSCHIEDER is Supt. Sunrise mines, Missoula, Mont.

T. C. DUDLEY is Supt. California quartz mine, Bath, Cal.

JAS. J. WARREN is manager White Bear mine, Rossland, B. C.

R. H. BYLES of London is examining Atlin, B. C., hydraulic mines.

A. CHESTER BEATTY has returned from Kokomo, Colo., to Denver.

CHAS. ADAMS is Supt. Cataract M. Co., North Fork, Plumas county, Cal.

THOS. McDONALD is manager Bloss & McClary mine, Trinity Center, Cal.

S. D. NICHOLSON has been re-elected general manager Midas M. Co., Leadville, Colo.

THOS. GOODWIN is elected general manager New Monarch M. Co., Leadville, Colo.

F. S. WINTERS, Supt. Silver Reef M. Co., Leeds, Utah, is visiting Gunnison, Colo.

G. W. CROWE, manager Arizona G. & C. Co., Patagonia, Ariz., has gone to Chicago.

E. R. BRADEN took charge of the A. S. & R. Co.'s smelter, East Helena, Mont., recently.

STEPHEN BIRCH is superintending Capt. DeLamar's copper reconnoissances in Alaska.

J. C. STEELE of the Golden Jubilee mine, Trinity Co., Cal., is visiting San Francisco.

J. D. HUBBARD, a Siskiyou county, Cal., assayer and metallurgist, is in San Francisco.

R. H. HUTCHENS, late Supt. Mother Lode mine, Greenwood, B. C., has gone to South Africa.

H. N. COOPER of Berkeley, Cal., goes as U. S. analytical chemist to Manila, P. I., U. S. A.

J. J. CRAWFORD of San Francisco is examining mining property in southwestern Oregon.

H. A. KELLER of San Francisco, Cal., is examining copper properties at Latouche Island, Alaska.

L. E. AUBURY, California State Mineralogist, has returned from Los Angeles, Cal., to San Francisco.

PERCEY SHARPE is now manager Monte Verde Grande C. Co., Magdalena, near Ixmiquilpan, Sonora, Mexico.

F. H. NEWELL, J. B. LIPPINCOTT AND L. H. TAYLOR of the U. S. Geological Survey are in San Francisco.

C. WEIDER has been appointed Supt. Brown-Pullen-Mayhew lease on the Jerry Johnson, Cripple Creek, Colo.

DANA HARMON has returned to San Francisco from an examination of mining properties in southern California.

B. BROOKS takes the superintendency of the lead mine at Ilse, Custer county, Colo., owned by the Grant smelter.

P. A. H. FRANKLIN, president Blackbird and Bluebird companies, has returned to Beaver, Utah, from Chicago.

DAVID T. DAY has returned from investigation of platinum properties in Josephine county, Or., and Del Norte county, Cal.

H. J. MASTERS has resigned as superintendent U. S. Slate Quarry, Bangor, Pa., to accept a similar position with the Eureka Slate Co., Kelsey, Cal.

S. SPROUT AND C. W. WALLER, interested in the proposed installation of a power plant on McCloud river, Shasta Co., Cal., have returned to San Francisco.

T. J. HURLEY of the Mine Securities Corporation and N. S. Shaler of Harvard University are en route to Alaska to examine mining property near Ketchikan.

ERNEST GAYFORD, late superintendent Horseshoe G. M. & M. Co., Fay, Nev., is at Mineral Springs, Union county, North Carolina, conducting tests for the Colossus G. M. & M. Co. for the Howle

mine, preparatory to erecting a 500-ton cyanide mill.

A. H. BROWN, general manager Trinity Copper Co., has returned to Kennet, Cal., from San Francisco.

ALVIN PHILLIPS of Denver has been appointed consulting and directing engineer for the Henson Creek Lead Mines Co., Lake City, Colo.

S. I. HALLETT, manager Silver Lakes M. Co., Silverton, Colo., has returned after an examination of mining property in southern Santa Fe county, New Mexico.

E. H. BENJAMIN, secretary California Miners' Association, has returned to San Francisco from an inspection of mine property at Hayden Hill, Lassen county, Cal.

T. H. OXNAM, who recently resigned as general manager of the Palmarejo & Mexican Gold Fields Co., Chihuahua, Mexico, has been appointed consulting engineer of the same company.

At a dinner recently given at Jobaneshurg, S. A., to W. L. Honnold, formerly of Calaveras county, Cal., there were twenty-six engineers and managers present, of whom fourteen were Americans.

E. E. CALVIN is general manager of the railway line built by Utah and New York men which will haul ore from the copper mines, Corra de Pasco, Peru, to Callao. The position is reported as carrying \$20,000 a year.

ROBSON L. WHITE, recently Supt. Highland Boy, Utah, smelter, and who last month declined a position at \$20,000 per year with McCune & Haggin in their Peruvian mines, is now general Supt. Standard Oil Co.'s plants at a large salary.

The thirty Colorado delegates to the International Mining Congress at Butte, Mont., Sept. 1, 2, 3, 4 and 5, are as follows: H. M. Teller, T. M. Patterson, J. F. Shafroth, C. S. Thomas, J. D. McCarthy, C. B. Whitford, Denver; B. F. Montgomery, F. J. Hanks, Cripple Creek; T. J. Ehrhart, Centerville; J. G. Schweigert, West Cliff; H. L. Lubers, Las Animas; W. L. Seeley, Boulder; T. Annear, Silverton; J. Kennedy, T. Stevens, Ouray; A. Mulqueen, Aspen; F. J. Annis, Fort Collins; W. E. Renshaw, Idaho Springs; F. C. Bolsinger, Central City; F. E. Wheeler, Creede; D. W. Shores, Carbonate; I. N. Bunting, Grand Junction; R. S. Ball, Meeker; R. E. Foote, Breckenridge; E. Bell, Trinidad; C. McConnell, Durango; J. W. Finch, F. M. Woods, Victor; W. S. Buckley, Telluride; A. V. Hunter, P. Mulrooney, Leadville; B. J. O'Connell, Georgetown; F. H. Frankenhunter, S. D. Trimble, Pueblo; J. C. Bell, Montrose.

Obituary.

LOUIS A. DUNKLE, Supt. of the Le Roi mine, Rossland, B. C., was instantly killed on July 27 by a cave on the 600-foot level of the mine. While a resident of Eureka, Nev., he served two terms as sheriff. Later he lived in Angels Camp, Cal., rising to the position of foreman at the Utica mine. Prior to going to Rossland, in December, 1901, Mr. Dunkle was Supt. of the Grant-Mariposa mine, in Mariposa county, Cal.

Commercial Paragraphs.

THE California Wire Works have moved their office to 46-48 Fremont St., San Francisco, Cal.

W. J. JONES has been appointed manager of the Denver office of the Stanley Electric Mfg. Co. of Pittsfield, Mass.

THE Holthoff Machinery Co., Cudahy, Wis., has, as its Mexico representative, R. E. Briggs & Co., Calle Gante No. 8, City of Mexico.

THE Jeanesville Iron Works Co., Jeanesville, Pa., the largest industry in that vicinity, will be removed to Hazelton, Pa. The works employ about 500 skilled men.

MR. SCHORR, M. E., of the Shannon Copper Co., Clifton, Ariz., and Mr. Paulsmeyer, M. E., late of the Rison Iron Works, have established an engineering bureau at 206 Sansome St., San Francisco.

THE Allis-Chalmers Co., Chicago, Ill., has declared the fifth consecutive quarterly dividend of 1 1/2%, payable August 1st, out of net earnings. A detailed financial report of the company's business appeared in the issue of June 28, 1902, occupying a full page and showing a prosperous condition of affairs, fully justifying the preliminary announcement made at the time of the company's incorporation.

THE Bear Gulch M. Co., of Jardine, Mont., have placed an order with the Salt Lake branch office of the Allis-Chalmers Co. for a 40-stamp mill, complete with bin gates, feeders, high mortars, forged steel shoes and dies, cast steel cams, tappets and

stamp heads, copper plates and pulleys, pillow blocks, shafting, etc. Also, for No. 5 style "D" Gates crusher, with manganese hoods and concaves, and two orders each for forty steel shoes and forty forged steel dies—one for the Gold King Syndicate and one for the Bear Gulch M. Co., Jardine, Mont.

Latest Market Reports.

SAN FRANCISCO, Aug. 1, 1902.

METALS.

SILVER.—Per oz., Troy; London, 24 3/4 (standard ounce, 925 fine); New York, bar silver, 52 1/2, refined (1000 fine); San Francisco, 53c; Mexican dollars, 43 1/2c San Francisco, 41 1/2 New York.

COPPER.—New York: Standard, \$11.30@11.50; Lake, 1 to 3 casks, \$11.65; carload lots, \$11.40; Electrolytic, 1 to 3 casks, \$11.50; carload lots, \$11.30; Casting, 1 to 3 casks, \$11.50; carload lots, \$11.25. San Francisco: \$14.00. Mill copper plates, \$17.00; bars, 18@24c. London: 252 15s 1d spot, per ton.

LEAD.—New York, \$4.12; Salt Lake City, \$3.50; St. Louis, \$4.00; San Francisco \$4.50, carload lots; 4 1/2c 1000 to 4000 lbs.; pipe 5 1/2, sheet 6, bar 5 1/2c; pig, \$4.75. London: £11 12s 6d per ton.

SPELTER.—New York, \$5.35; St. Louis, \$4.50; London, £18 17s 6d per ton; San Francisco, ton lots, 5 1/2c; 100-lb lots, 6 1/2c.

ANTIMONY.—New York, Cookson's, 9 1/2c; Hallett's, 8 1/2c; San Francisco, 1000-lb. lots, 10c; 300 to 500 lbs., 11c; 100-lb. lots, 13@15c.

TIN.—New York, pig, \$28.10; San Francisco, ton lots, 31c; 1000 lbs., 31c; 500 lbs., 31 1/2c; 200 lbs., 32c; less 32 1/2c bar tin, 3 1/2c. London, £125 12s 6d spot.

PLATINUM.—San Francisco, crude, \$13.00 3/4 oz.; New York, \$18.50 per Troy oz. Platinum ware, 75@80c per gram.

QUICKSILVER.—New York, \$48.00 large lots; London, £8 15s; San Francisco, local, \$46.00 3/4 flask of 7 1/2 lbs.; Denver, \$50.00. Export, \$44.00.

BABBITT METAL.—San Francisco, No. 1, 10 1/2c.

ALUMINUM.—New York, No. 1, 99% pure ingots, 35c; No. 2, 90%, 30c to 34c.

SOLDER.—Half-and-half, 100-lb. lots, 20c; San Francisco, Plumbers', 100-lb. lots, 16 1/2c.

NICKEL.—New York, 50@60c 3/4 lb.

STRUCTURAL MATERIALS.

IRON.—Pittsburg, Bessemer pig, \$22.00; gray forge, \$21.00; San Francisco, bar, 3c 3/4 lb., 3 1/2c in small quantities.

STEEL.—Bessemer billets, Pittsburg, \$32 and \$33; open hearth billets, \$34.00; San Francisco, bar, 7c to 12c per lb.

CHICAGO CURRENT QUOTATIONS.

Bessemer.....	\$23.50@24.50
Foundry Northern 1.....	22.00@23.00
Northern 2.....	21.50@22.50
Northern 3.....	21.00@22.00
Southern 1.....	21.15@22.15
Southern 2.....	20.65@22.15
Southern 3.....	20.15@21.15
Forge.....	19.65@20.65
Charcoal.....	24.00@24.50
Billets, Bessemer.....	33.00@34.00
Bars, iron.....	1.85@1.95
Bars, steel.....	1.75@1.85
Rails, standard.....	28.00@30.00
Rails, light.....	34.00@40.00
Plates, boiler.....	1.90@2.00
Tank.....	1.75@1.80
Sheets, 26 store.....	3.25@3.40
No. 27.....	3.35@3.50
No. 28.....	3.45@3.60
Angles.....	1.75@1.80
Beams.....	1.75@1.85
Tees.....	1.80@2.00
Zees.....	1.75@2.25
Channels.....	1.75@2.25
Steel melting scrap.....	19.00@20.00
No. 1 railroad wrought.....	21.00@22.00
No. 1 cast, net ton.....	15.00@16.00
Iron rails.....	24.00@25.00
Car wheels.....	21.00@22.00
Cast borings.....	10.00@10.50
Turnings.....	14.00@14.50

CEMENT.—Germania, \$2.80; K. B. & S., \$2.80; Hewmoor, \$2.70; Trowell, \$2.70; Portland, \$3.30 per bbl.

LIME.—Santa Cruz, \$1.75; Roche Harbor, \$1.70 per bbl.

LUMBER.—(Retail): Pine, ordinary sizes, \$20.00@22.00; extra sizes higher; redwood, \$22.00@23.00; lath, 4 feet, \$4.25 @4.50; pickets, \$19.50; shingles, \$2.35 for No. 1 and \$2.00 for No. 2; shakes, \$13.50 for split and \$14.50 for sawed; rustic, \$26.00 @32.00.

NAILS.—Per keg (list prices): No. 20d to 60d, Wire, \$3.50; Cut, \$3.50; 10d to 16d, Wire, \$3.55; Cut, \$3.55; 8d, Wire, \$3.60; Cut, \$3.60; 6d and 7d, Wire, \$3.70; Cut, \$3.70; 4d and 5d, Wire, \$3.80; Cut, \$3.80; 3d, Wire, \$3.95; Cut, \$3.95; 2d, Wire, \$4.20; Cut, \$4.20. Special rates for carload lots.

GENERAL SUPPLIES.

POWDER.—F. O. B. San Francisco: No. 1. 70% nitro-glycerine, per lb., in carload

lots, 15 1/2c; less than one ton, 17 1/2c. No. 1, 60%, carload lots, 13 1/2c; less than one ton, 15 1/2c. No. 1** 50%, carload lots, 11 1/2c; less than one ton, 13 1/2c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2** 35%, carload lots, 9 1/2c; less than one ton, 11 1/2c. No. 2** 30% carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 728 kegs, \$1.50 per keg; less car lots, \$2 per keg.

CAPS.—3x, \$5.50 per 1000; 4x, \$6.50; 5x, \$8; Lion, \$9, in lots not less than 1000.

FUSE.—Triple tape, \$3.60 per 1000 feet; double tape, \$3.00; single tape, \$2.65; Hemp, \$2.10; Cement No. 2, \$3.00; Cement No. 1, \$2.55, in lots of 3000 feet and up.

CANDLES.—Granite 6s, 16 oz., 40s. 10c 3/4 set; 14 oz., 40s., 9c.

COAL.—San Francisco, coast, yard prices: Wellington, \$8; Seattle, \$6.50; Coos Bay, \$5.50; Southfield, \$8.00. Cargo lots, Eastern and foreign: Wallsend, \$7.50; Brynbo, \$7.50; Pennsylvania, hd., \$14.00; Scotch, \$8; Cumberland, \$12; Cannel, \$11; Welsh Anthracite, \$13.00; Rock Springs, \$9.00, long ton; Colorado Anthracite, \$14.00. Coke, \$13 per ton in bulk, \$15 in sacks; Sunnyside, \$11.50, long ton.

One of the singular things is that today anthracite coal is selling at \$8 per ton in New York City, and the best quality of bituminous coal at the same price in San Francisco.

CHEMICALS.—Cyanide of potassium, 98%-99%, jobbing, 27@28c 3/4 lb.; carloads, 25@26c; in 10-lb. tins, 38c; sulphuric acid, in carboys, 66% B, 2c 3/4 lb.; soda ash, \$2.00 3/4 lb.; hyposulphite of soda, 23@23c 3/4 lb.; blue vitriol, 5 1/2@6 1/2c 3/4 lb.; borax, concentrated, 7@8c 3/4 lb.; chlorate of potash, 12@13c; roll sulphur, 5c; alum, \$2.00@2.25; flour sulphur, French, 2 1/2@2 3/4c; California refined, 1 1/2@2c; nitric acid, in carboys, 8c 3/4 lb.; caustic soda, in drums, 3@4c 3/4 lb.; Cal. s. soda, hbls., \$1.25 @1.50 3/4 lb.; sds., \$1.05; chloride of lime, spot, \$2.50@2.60; nitrate of potash, in bbls., 8c; caustic potash, 10c in 40-lb. tins.

OILS.—Linsed, boiled, hhl., 73c; cs., 78c; raw, hhl., 71c; cs., 76c; lots of 5 hbls., 1c less; Lucol oil, hbl., 64c; cs., 70c; raw, hbl., 62c; cs., 67c. Kerosene—Pearl, per gal., 20c; Astral, 20c; Star, 20c; Extra Star, 24c; Eocene, 25c; Elaine, 22c; Water White, in bulk, 13 1/2c; Mineral Seal, iron bbls., 19c; wooden bbls., 22 1/2c; cs., 25c; Mineral Sperm, cs., 26 1/2c; Deodorized Stove Gasoline, hulk, 16c; do., cs., 21 1/2c; 88° Gasoline, bulk, 20c; do., cs., 26 1/2c; 68° Naphtha or Benzine, deodorized, in hulk, per gal., 14 1/2c; do., in cs., 21c; Lard Oil, No. 1 hbl., 60c; cs., 65c; Neatsfoot Oil, hbl., 70c; cs., 75c; No. 1 hbl., 52 1/2@55c; cs., 57 1/2@60c; Sperm, crude, 60c; Natural White, 65c; Bleached do., 70c; Whale Oil, cs., 55c.

WHITE LEAD.—Per lb., in kegs: Five tons and over at one purchase, per lb., 6 1/2c; 1 ton and less than 5 tons, per lb., 6 1/2c; 500 lbs. and less than 1 ton, per lb., 7c; less than 500 lbs., per lb., 7 1/2c; in 25-lb. tin pails, 1c per lb. above keg price; in 1 and 1/2 lb. tin cans, 100 lbs. per case, 2 1/2c per lb. above keg price. Dry Lead.—In hbls., 1 ton and over, 6c; do. in kegs, 6 1/2c.

RED LEAD AND LITHARGE.—One ton and over at one purchase, per lb., 7c; 500 lbs. and less than 1 ton, per lb., 7 1/2c; less than 500 lbs., 7c.

ASSAY LITHARGE.—Per lb., 8 1/2c.

BISMUTH.—Sunbrite, per lb., \$1.60.

BONE ASH.—4c 3/4 lb.

BORAX.—Crystal, 7c; calcined, 25c.

CHROMIUM.—(90% and over) per lb., \$1.25.

COPPER.—Carbonate, 20c; Red oxide, 3/4 lb., 60c.

MAGNESIUM.—Per lb., \$3.00.

MANGANESE.—(90% and over) 3/4 lb., \$1.25.

MERCURY.—Bichloride, 3/4 lb., 90c.

MOLYBDENUM.—25c. 3/4 gramme; 1000 grammes—2 1/2 lbs.

PHOSPHORUS.—(American) 3/4 lb., 80c.

SILVER.—Chloride, 3/4 oz., 75c; nitrate, 55c.

SODIUM.—Metal, 3/4 lb., \$1.00.

URANIUM.—Oxide, 3/4 lb., \$3.50.

ZINC.—Metallic, chemically pure, 3/4 lb., 50c.

ZINC.—Dust, 3/4 lb., 10c.

ZINC.—Sulphate, 3/4 lb., .04c.

(These prices are wholesale, f. o. b. San Francisco, unless otherwise noted.)

Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

AUTOMATIC LOCKING MECHANISM FOR SIDEWALK OR OTHER ELEVATOR DOORS.—No. 704,746. July 15 1902. P. H. Jackson, San Francisco, Cal. This invention relates to an automatic mechanism for securing and releasing elevator hatchway doors, and is especially applicable to the doors which close over sidewalk elevator platforms or hoists. It consists of an elevator hatchway having doors hinged at opposite sides to close centrally, bolts guided and slidable parallel with and contiguous to the edge of one of the doors,

and a hollow sleeve into the end of which the adjacent ends of the two bolts extend, forming two members, said bolts and sleeve having pin and slot connections. An annular flange projects around the periphery of the sleeve and there are lugs or channels upon the door between which said flange is guided and turnable. A weight is hinged to and projects from the sleeve at right angles with its axis of rotation, and a supplemental weight projects from the outer end of the first-named weight and is turnable loosely with relation thereto. Stops are arranged by which the turning movement is arrested and the weight is caused to stand at an angle when the doors are opened.

INK WELLS.—No. 705,485. July 22 1902. G. H. True, East Oakland, Cal. This invention is designed to provide an ink well of the class which may be fixed in desks or similar structures, and to provide a permanent dust-proof structure, with means for obtaining access to the interior of the well. The well has a horizontal flange and a vertical cylindrical well of less diameter extending above and having an opening therethrough. A cap with a corresponding opening on one side fits over the extension, and a clamp by which the cap is held in place is revolvable in a horizontal plane. The clamps extend across the top of the cap and continue down the sides, having vertical channels to receive the extending portion of the clamp.

New Patents.

DEWEY, STRONG & CO.'S SCIENTIFIC PRESS PATENT AGENCY, 330 Market St., S. F., has issued reports of the following U. S. patents issued to Pacific coast inventors:

FOR THE WEEK ENDING JULY 22, 1902.

705,194.—DRESS CHART.—Mary L. Avery, Oakland, Cal.
705,303.—CAR STANDARD.—E. O. & M. L. Bradley, Tacoma, Wash.
705,383.—CARRIER.—J. G. Cofman, Comptche, Cal.
705,216.—FUEL.—J. T. Davis, S. F.
705,060.—PIPE WRENCH.—J. T. Ford, S. F.
705,306.—JUN CLEANER.—G. H. Garrison, Bucoda, Wash.
705,071.—PACKING FRUIT.—L. F. Graham, San Jose, Cal.
705,401.—GATE.—S. Hamilton, Endicott, Wash.
705,403.—SQUARE.—C. L. F. & M. C. Hooker, Boca, Cal.
705,411.—TYPE WRITER.—O. L. Ingram, Walla Walla, Wash.
705,256.—SEWING MACHINE.—F. T. Leitch, S. F.
705,257.—SEWING MACHINE.—F. T. Leitch, S. F.
705,268.—GRGVOING TOOL.—A. R. Meister, Sacramento, Cal.
705,149.—REFINING COPPER.—G. Mitchell, Naco, Ariz.
705,425.—PUMP.—B. Musser, New Whatcom, Wash.
705,431.—VEHICLE BRAKE.—J. Ortel, Tempe, Ariz.
705,433.—TRAVELING BAG.—Phillips & McHenry, Portland, Or.
705,147.—DOOR OPENER.—G. Rischmuller, S. F.
705,301.—LATCH.—E. J. Root, S. F.
705,465.—LOG RELEASER.—E. W. Spencer, Portland, Or.
705,483.—INK WELL.—G. H. True, East Oakland, Cal.
705,187.—WATER HEATER.—F. Walker, Los Angeles, Cal.
705,184.—INKING APPARATUS.—Woodruff & Caton, San Jose, Cal.

SITUATIONS WANTED.

Chemist and Assayer with five years' experience in both mine and smelter work desires position. Technical graduate; finest references. Address "Chemist and Assayer," care of this office.

WANTED.—An all-round miner wants position as foreman. Over 22 years' experience in practical mining and handling men. Best of reference. Address Call Box 29, Welser, Idaho.

WANTED.—Employment at mine by young, experienced Assayer, Surveyor and Bookkeeper. References. Address A. H., care of this office.

Position wanted by Assayer and Surveyor at present employed in Arizona. Will go any place. Few years' experience East and West, and a good technical education. Address A. B. C., care of Mining and Scientific Press.

WANTED.—Position as Assayer and Bookkeeper in a mine; experienced in underground work; good references; present position not desirable. Address Box No. 127, care of this office.

PRACTICAL MILLMAN.—AMALGAMATOR, Classifier, Man and Assayer, wishes position. School of Mines graduate. Best references. Address R. B., care of Mining and Scientific Press.

WISH A POSITION AS SUPERINTENDENT or Assayer. Have had experience in mining, milling, cyaniding and smelting, and in putting up and running the machinery. Can sharpen tools. Jesso L. Wetmore, 644 E. Main St., Stockton, Cal.

MINE FOREMAN.—Young man (33) with 14 years' experience as a practical miner in Montana, Idaho, Black Hills, Arizona and California, energetic and possessed of fair technical knowledge, desires position with some progressive company. Fully conversant with standard air drills and familiar with all systems of timbering. Would like position where progressive methods are used to economical extraction would be appreciated. Foreign countries not objected to. First-class references as to ability and general reputation. Address C. M. A., care Mining and Scientific Press.

A technically educated Mining Engineer, at present employed as superintendent of mines for one of the largest corporations in Mexico, desires a change of position to the United States about July 1st. Has had 18 years' successful experience as engineer and superintendent, never having made a failure; 36 years of age; strictly temperate; a skilled designer, geologist and metallurgist; and a practical miner, as well as a hard worker and thorough business man. References of the highest order, including present employers. Address Supt., care this office.

EXAMINATION OR SUPERVISION of Mines, Smelters and Mills.

Mining Engineer and Metallurgist, of unquestionable reputation and long experience, now permanently residing at Seattle, Wash., will examine or take general supervision of mines, smelters or mills, in Pacific Coast States, British Columbia or Alaska, as consulting engineer, for reliable parties. Is also reliable accountant to examine. Box 813, Seattle.

WANTED.

A YOUNG MECHANIC WITH SEVERAL EXCELLENT patentable ideas would like assistance of capitalist or manufacturer. No airships, just plain every-day necessities. Address J H., care of this office.

WANTED—BY TWO ENERGETIC AND EXPERIENCED mining men the acquaintance of someone interested in the development of mining property in old Mexico. Address D. L. C., care of this office.

Wanted to Bond a Dry Placer Claim, One Rich in Flour Gold.

Must be a dry proposition. Address "Placer Claim," care this office.

WANTED.**FREE GOLD PROSPECT**

on which to incorporate a company, or to develop under lease and bond. Must be gilded and have ore of milling grade in sight. Send full particulars to H., care of this office.

FOR SALE.**Gold Mining Properties For Sale.**

Two First-Class Placer Mines, one having 20 years' record as a producer. Both in good working condition. Terms reasonable. Address "Enquire," care this office.

The Mines Exchange, Ltd.

Mines and prospects in British Columbia, the Western States, and Mexico, for sale. Free milling gold properties a specialty. Write us for reports and information. Bank references given. Address THE MINES EXCHANGE, LTD., P. O. Box 700, Nelson, B. C. Branch Office: P. O. Box 584, Salmon City, Idaho.

LUCIAN W. KNIGHT. C. DUDLEY DEAN.

DEAN & KNIGHT,
Purchasing Agents for Mines and Mills,

218 HAYWARD BLDG., SAN FRANCISCO.
Reference: Anglo-Californian Bank, Ltd.

H. C. BIGGS,

Sole Agent for the

LIGHTNER QUARTZ MILLS,
McGLEW Improved ORE CONCENTRATORS.

Plans and Estimates for all kinds of MACHINERY.
5 Market St. Phone James 3798. San Francisco.

MINERS' AND PROSPECTORS' GUIDE.
REVISED THIRD EDITION.

By James Irving & Co., Gold Refiners and Assayers,
128 N. Main St., Los Angeles, Cal.

Contains U. S. State and Territorial Mining Laws, as well as much useful information for miners and millmen.

Price 25 Cents.

Quicksilver

BY THE FLASK OR CARLOAD.
WEIGHT AND QUALITY GUARANTEED.

The Eureka Company,
OF SAN FRANCISCO.

320 SANSOME STREET, - SAN FRANCISCO.

Quicksilver

IN LOTS TO SUIT.

Write for Quotations.
REDINGTON & CO., 23-25-27 Second Street,
SAN FRANCISCO, CAL.

MICHIGAN COLLEGE OF MINES.

An Engineering School with unique location, giving it unusual facilities. New Mining Engineering and Hydraulic Building, also Chemical and Metallurgical Building ready for fall term 1902. For catalogue giving list of graduates and their occupations, address

F. W. McNAIR, Pres't, Houghton, Mich.

THE CALIFORNIA DEBRIS COMMISSION having received applications to mine by the hydraulic process from Fred. G. Low Jr., in the Lone Star Mine at Cromberg, Plumas County, Cal., to deposit tailings in Jackson Ravine, draining into Jackson Creek; from E. H. Wemple and A. M. Davis, in the Clippership Mine, near St. Louis, Sierra County, Cal., to deposit tailings in Cedar Grove Ravine, draining into Slate Creek; from Cataract Gold Mining & Power Co. in the Indian Bar Placer Mine, near Spanish Ranch, Plumas County, Cal., to deposit tailings in basin draining into North Fork of Feather River; and from Geo. W. Cox, in the Doherty Mine, at Howland Flat, Sierra County, to deposit tailings in Slate Creek, give notice that a meeting will be held in room 86 Flood Building, San Francisco, Cal., on August 4, 1902, at 1:30 P. M.

Some Reasons

Why You Should Insist on Having

EUREKA HARNESS OIL

Unequaled by any other.
Renders hard leather soft.
Especially prepared.
Keeps out water.
A heavy bodied oil.

HARNESS

An excellent preservative.
Reduces cost of your harness.
Never burns the leather; its efficiency is increased.
Secures best service.
Stitches kept from breaking.

OIL

Is sold in all Localities

Manufactured by
Standard Oil Company.

THE best advertising mediums are those publications that are read the closest. Every line of this paper is weekly scrutinized by 50,000 intelligent, observing men.

Arizona & Sonora Manufacturing Co.

NOGALES, ARIZONA.

ROY & TITCOMB, INC., Sales Agents,

Are Prepared to Erect and Equip STAMP MILLS, CYANIDE PLANTS, HOISTING WORKS, Etc., Etc.

Manufacture and Carry in Stock HOISTING ENGINES, HORSE WHIMS, ORE CARS, ORE BUCKETS, ROCK CRUSHERS, Etc.

Carry in Stock a Full Line of BOILERS, ENGINES, PIPE, and MINE, MILL AND SMELTER SUPPLIES.

ESTIMATES CHEERFULLY FURNISHED. CORRESPONDENCE SOLICITED.

STANDARD METAL CO.

7 E. Monroe Street, CHICAGO.

SMELTERS—REFINERS—ASSAYERS
OF GOLD AND SILVER BEARING PRODUCTS.

Nuggets and Rich Gold Specimens Purchased.

HIGH GRADE ASSAY WORK.

DEALERS IN

Silver Anodes for Plating Amalgamating Plates.

PLACER MINING DREDGES
—WITH—
IMPROVED BUCKETS and CHAINS

Having the

**ONLY
GRIT-
PROOF
Articu-
lations.**



Tailing
Stackers.

Screens.

Elevators

AND

Conveyors

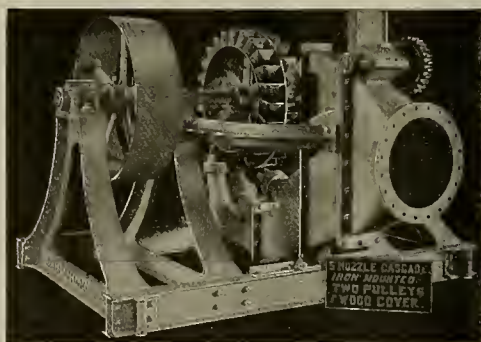
FOR

Ore, Slag,
Concentrates, etc.

LINK-BELT MACHINERY CO., Chicago,
U. S. A.

DENVER, 822-17th St. A. E. Lindrooth, Mgr.

SAN FRANCISCO, Meese & Gottfried Co.

**CASCADE**

WATER WHEELS for HIGH HEADS.

Considering the all around EXCELLENCE and high QUALITY of the work we turn out, the PRICES we ask are extremely LOW.

We also build the celebrated

SAMSON TURBINE

on UPRIGHT or HORIZONTAL SHAFTS.

Write Dept. "AA" for catalogues.

JAMES LEFFEL & CO., SPRINGFIELD, OHIO, U. S. A.

HARRON, RICKARD & McOONE,
21 Fremont St., San Francisco,

Sole Agents for
California, Arizona and Nevada.

A. MERLE, President.

Established 1865.

NOTICE TO GOLD MINERS.

A. RUDGEAR, Manager.

Incorporated 1890.

Silver-Plated Copper Amalgamated Plates

FOR SAVING GOLD IN QUARTZ, GRAVEL OR BEACH MINING.
MADE OF BEST SOFT LAKE SUPERIOR COPPER.

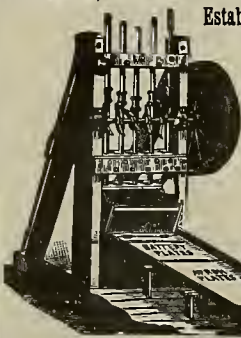
AT REDUCED PRICES.

Our Plates are guaranteed, and by actual experience are proved, the best in weight of Silver and durability. Old Mining plates replated, bought, or gold separated. THOUSANDS OF ORDERS FILLED.

A. MERLE CO., Successors to

SAN FRANCISCO NOVELTY AND PLATING WORKS,

515-517-519 Mission St., above First, San Francisco, Cal.
SEND FOR CIRCULARS. TELEPHONE MAIN 976.



MINING AND SCIENTIFIC PRESS

Whole No. 2194.—VOLUME LXXXV.
Number 6.

SAN FRANCISCO, CAL., SATURDAY, AUGUST 9, 1902.

THREE DOLLARS PER ANNUM.
Single Copies, Ten Cents.

Determination of Minerals.

An article, "Hints to Prospectors," on page 62 of last week's issue, concerning the advisability of looking out for other things than gold, silver and copper when on a prospecting trip, has led to sundry suggestions that a few remarks on determination of minerals so noted might not be amiss.

In this regard it may be said that in the rough determination of an unfamiliar mineral the senses should work together; to determine exactly characteristics, one at a time, is laboratory rather than field practice. A trained mineralogist cannot always be sure and prompt in making determinations, and the best that the beginner or prospector can hope to do in many cases is to determine a mineral approximately. Minerals show such an infinite variety of color and form, and the number of distinct species is so large, that an attempt to remember the appearance of all species is not to be recommended. Yet the common species are not many, and with them the prospector should be familiar. When a strange feature is found the most obvious characteristics will be the color and the crystalline form, but these are often insufficient to determine the material, and further tests are necessary. Only persons of scant knowledge and little experience give hasty opinions with confidence. It is essential that the mineralogist should know quartz, feldspar, mica, calcite, hematite, galena, pyrite, sphalerite and chalcopryite so well that he can be certain of the mineral by a simple test. In this connection it is well to remember that a mineral of unfamiliar look is more likely to be a rare form of a common mineral than a rare mineral. When the mineralogist finds a mineral that looks strange he mentally runs over the characteristics of the common minerals most resembling it, and then by a simple test can often decide definitely. Thus albite, feldspar and baryte may have the same color and the same general form, but a test of hardness with a knife blade would settle all doubt, to say nothing of baryte feeling noticeably heavy. Beryl and apatite occur in green, hexagonal crystals, but beryl is much the harder. A test with a piece of quartz settles all doubt. Much can be determined by hand and eye, however—often the form and structure of

the mineral, its cleavage, color, luster and transparency. Then should come tests for hardness. A calcite crystal, a steel knife blade and a quartz crystal in the majority of cases will show the hardness with sufficient accuracy. The color of the streak or powder left in making the hardness test is often of importance and must be noticed. A magnetized knife blade will determine magnetite and pyrrhotite at once. Specific gravity tests need special apparatus for exact work, but if the mineral feels noticeably heavy the fact is often important. The tests of the mineral and its feel are important. Having exhausted the simple tests and being still in doubt, the observer may try chemical tests. Dilute hydrochloric acid will make bits of calcite effervesce briskly, while other carbonates will effervesce in concentrated or hot hydrochloric acid. The odor of sulphuretted hydrogen is easily detected when effervescence takes place with warm acid. The smell will show that the mineral effervescing is not a carbonate, but a sulphide. The solution obtained may be tested for copper or iron, and, if the mineral is insoluble, the fact is of importance. If the mineral is still undetermined, recourse to the blowpipe is necessary. Heating any mineral of metallic luster in the open tube will determine the presence of sulphur, arsenic, antimony and mercury; the closed tube tests will confirm those of the open tube. Heating on charcoal will show the presence of lead or zinc, also, in many cases, by the addition of soda, of any reducible metals, as lead, copper, silver, tin, etc. To obtain

reliable results in the above tests pure mineral should be used; this is particularly true in the case of sulphide ores. Often such ores are not a single distinct mineral, but a mixture of minerals. Any mixture of these various minerals in making tests will vitiate results.

If, after this procedure, the mineral is still undetermined, recourse should be had to some complete determination table, and, if the mineral is a distinct species, a person having a little skill in using the blowpipe can soon determine it.

Head Frames for Shafts.

In the issue of May 24, '02, appeared illustrations of shaft head gear of recent construction in California, Colorado and Montana. Herewith is presented a picture of a type of timber construction, in which it is designed that there shall be eliminated useless members, and wherein the working strains are met in the most direct manner. The head gear portrayed has just been erected at the Keystone mine, Amador county, Cal. It will be noted that, although the shaft is an incline with the winding engine on the hanging wall, yet the resultant falls well within the base of the structure, making the strains on all principal members compressive. The top of the posts and braces are simply scarfed and bolted together, and upon the apex thus formed the journal box is seated. The hoisting strain is thus taken up directly by the posts and braces, without the expense and intervention of caps, stringers and bridge trees, as in some four-post "California types." In the Montana type the bridge trees and girts are framed together, and to the posts by mortises and tenons, upon which the entire strain is thrust. This construction utilizes but a portion of the strength of the members, and the transverse strains on bridge trees and girts is so severe that the type is ordinarily suitable only for light duty. The Keystone frame, with slight modifications, is suitable for inclines with the winding gear on the foot wall as well, and also for vertical shafts. The frame, as shown, was designed and constructed by D. E. Bigelow of the Union Iron Works, San Francisco, Cal. The lower engraving is a flashlight view of the timbering in the 500 level, foot wall, 900 feet south of main shaft, 100 feet wide between walls.



Head Frame Keystone Shaft, Amador County, Cal.



Keystone Mine, Amador County, Cal.; 500 Level, South.

MINING AND SCIENTIFIC PRESS.

ESTABLISHED 1860.

Published Every Saturday at 330 Market St., San Francisco, Cal.

TELEPHONE, DAVIS 771.

ANNUAL SUBSCRIPTION:

United States, Mexico and Canada.....\$3 00
All Other Countries in the Postal Union.....5 00

Entered at the San Francisco Postoffice as second-class matter.

Chicago Office (Telephone, Harrison 73).....737 Monadnock Block.
Denver Office (Telephone, Olive 733).....606 Mack Block.

J. F. HALLORAN.....Publisher.

San Francisco, August 9, 1902.

TABLE OF CONTENTS.

ILLUSTRATIONS—Head Frame Keystone Shaft, Amador Co., Cal.; Keystone Mine, Amador Co., Cal. 503 Level, South, 63. Diagram Illustrating Editorial on "Value of the Hot Blast in Smelting," 73. Automatic Dumping Device, 74. Mining and Metallurgical Patents, 76.

EDITORIAL—Determination of Minerals; Head Frames for Shafts, 70. Value of the Hot Blast in Smelting; Discovery of a New Property of Matter; Progressiveness in Mining, 70.

MINING SUMMARY.—77-78-79-80.

LATEST MARKET REPORTS.—81.

MISCELLANEOUS—Concentrates, 71. Live Foundations; Copper in Northern California; Gasoline Engine and Dynamo, 72. "Miners' Wages in Mexico;" Identification of Metals of the Platinum Group, 73. Automatic Dumping Device; Drilling for Gold Dredging; The Pachuca Stamp Battery and Its Predecessors, 74. Sulphur; Pyrite; Alaska-Treadwell Costs, Etc.; Refined Copper Ores, 75. Mining and Metallurgical Patents, 76. Personal; Commercial Paragraphs; Obituary; New Patents; Notices of Recent Patents; Recently Declared Mining Dividends, 80-81.

Value of the Hot Blast in Smelting.

In the concluding article on "Costs and Profits in Pyritic Smelting of Low-Grade Copper Ores," which appeared in the issue of the MINING AND SCIENTIFIC PRESS of June 21, 1902, calculations were given based upon hypothetical smelting conditions in which the heat generated in the furnace by the oxidation of coke, iron and sulphur added to that brought in by the hot blast made a total of about 400,000 British thermal units per minute, while the heat carried off by the escaping gases amounted to 27% of this on the assumption of a temperature of 600° above that of the external air and 133% surplus air (that is, the surplus above the chemical requisite).

The usual method of calculating the temperature of combustion is to divide the units of heat generated by the product of the weight of the resulting gases of combustion and their specific heat. The air per minute was 665 pounds and the resulting gases 668 pounds, making the increase in temperature, therefore, $400,000 \div (688 \times .238) = 2443^\circ$, which added to 62° gives 2505° Fahr. For reasons to be given this figure is too high, but following the method further we should have with 100% surplus air a temperature of 2900°.

As applied to a smelting furnace this method is based on several obviously wrong assumptions. The heat value of the fuels, iron, sulphur and carbon are based upon an initial temperature of 62° Fahr., whereas when they reach the smelting zone in a furnace they have acquired a high temperature and thus bring in additional heat which must be taken into consideration. On the other hand, silica and lime, although already at a high temperature, will absorb some heat in passing into the fusion zone. The main consideration is, however, that a considerable quantity of fuel is consumed before it can reach the smelting zone, and the amount, therefore, available for heating the air blast (in that part of the furnace where the highest temperature is required) is thereby reduced, which consequently reduces in the same ratio the temperature attainable at that point. In the estimate showing a possible temperature of 2900° Fahr. with 100% surplus air and 562° temperature of blast, on the basis that all of the fuel had been consumed in the smelting zone, the results would have been 585° less $[(2900 - 562) \div 4]$ or 2315° Fahr. in case 25% of the fuel had been allowed for as consumed before reaching that point.

In pyritic smelting a due proportion of iron and sulphur must be oxidized before reaching the smelting zone in order to avoid carrying too much of the readily fusible iron sulphides into the matte and thus rendering it too low grade. Under the conditions specified in the article referred to it was found that the temperature would have been 2500° Fahr. had all

the heat been generated within the limits of the smelting zone—which of course could not be the case. Half of the heat was derived from the iron and sulphur, the remainder from the coke and hot blast. Assuming that half the oxidation of the iron and sulphur had taken place above the zone of fusion, the calculated temperature would be 1900° Fahr., this being the average temperature, some portions of the zone being higher and others lower, slag formation, requiring a higher temperature, and oxidizing action, possible at a much lower temperature, going on simultaneously.

The sole benefit of chemical action taking place in the charge of ore, flux and fuel before it reaches the smelting zone is to prepare the ore and flux for the work to be done there. These chemical reactions take place at comparatively low temperatures, beginning below 500° and increasing in activity until the highest temperature of the furnace is reached. The reduction of Fe_2O_3 to FeO requires the presence of carbon or carbon monoxide, but in pyritic smelting the atmosphere is distinctly an oxidizing one, and coke in the charge is absolutely unessential except for the production of heat, and this heat is simply needed to create a sufficiently high temperature in that region of the furnace where fusion takes place. Heat alone is required to drive off the moisture, the volatile sulphur atom of the iron pyrites and the carbonic acid of the limestone. This heat and the heat necessary to raise the entire charge to the proper temperature before it reaches the smelting zone is present in the air and gases passing upward through the charge from that point, and hence it is plain that the more the heat is concentrated the greater will be the efficiency, the more uniform the smelting and the smoother the operation of the furnace. To accomplish this is the function of the hot blast, the saving of coke per ton of ore smelted and the increased capacity of the furnace being incidental thereto.

In pyritic smelting—by which is meant not the entire exclusion of carbonaceous fuel, but the roasting and smelting of sulphide ores in one operation, the heat generated being used to replace carbonaceous fuel, and which, therefore, requires an oxidizing atmosphere—every pound of coke consumed above the smelting zone is a clear waste, and only that portion of the coke which yields its heat for the sole purpose of bringing the temperature of the smelting zone up to the requirements of slag formation—which is somewhat higher than that of slag fusion—produces any useful effect.

A hot blast does not mean a hot top; quite the contrary. In fact, a change from hot blast to cold blast causes the zone of fusion to creep upwards in the furnace, and this action may sometimes be availed of to melt down the accretions that have formed in that region.

The quantity of heat required to raise the temperature of the blast 100° depends upon the amount of surplus air. In the diagram on page 73 the amount is assumed as 133% and the general results are sufficiently close to afford an approximate estimate under ordinary conditions.

The diagram covers coke cost up to \$30 per ton (2000 pounds) and varying costs and classes of fuel for heating the blast, which are designated under the headings A, B, C, D and E. The saving in fuel cost per annum per 100 tons daily charge, and per 100° increased temperature of blast, is given at the right hand side of the diagram. The estimate allows for ordinary delays and shutdowns and for average qualities of fuels, and is conservative.

For an example, let us take a 200-ton daily charge, a coke cost of \$15 per ton and an oil cost of \$1.25 per barrel, with the blast heated 500°. The heading B covers oil at \$1.25 and the line marked B intersects the vertical line of \$15 coke at the point marked X, which shows horizontally at the right a saving of \$1500, which for 500° and for 200 tons daily charge makes an annual saving of \$15,000. Line A, being the line for no cost of fuel, covers the case where the blast is heated by the waste heat of the furnace—that is, by the slag, the gases, or the jacket. Point Y marks the intersections of the line A and the \$15 coke line, and if it were possible to heat the blast 500° by such means the saving would have been for 200 tons daily charge \$25,000 per annum.

In an iron furnace about 80% of the carbon of the

coke passes off as carbon monoxide, but in pyritic smelting scarcely more than a trace of this gas will be found; so that there are only the three sources above mentioned which can be utilized—other than the cheap fuel—and of these the slag carries by far the most heat. Mechanical difficulties alone stand in the way of taking advantage of its full value, although it actually contains nearly double the heat required to bring the blast to a temperature of 500° above that of the external air. An examination of diagrams Nos. 4 and 7 (issues of May 31 and June 7, 1902), will make this clear. It will be noted that while the air required per minute to smelt 100 tons of ore varies tremendously with the type of ore used and the type of slag made, the amount of air per ton of slag produced is practically constant and depends simply upon the temperature of the blast, being practically independent of the per cent of silica or iron in the ore, or of the type of slag. Assuming 133% surplus air as the maximum requirement, there will be needed per ton of slag per twenty-four hours not to exceed 100 cubic feet of air per minute with cold blast and 80 cubic feet with a blast at 500° F., and for 100% surplus air, as a reasonable average, about 65 cubic feet. A ton of slag per day is 14 pound per minute, and the heat contained, sensible and latent, is about 1200 B. t. u., while that required to raise 65 cubic feet of air per minute 500° is 600 B. t. u.

The fact should not be lost sight of that the hot blast makes possible a more siliceous slag, thereby cutting down the amount of limestone flux and proportionately reducing the percentage of coke and effecting other small economies as a consequence, and also making easier a clean separation of matte and slag. It is believed that, as against all the advantages which have been enumerated in favor of hot blast, nothing as an offset can be said for cold blast.

Since for every 100° increased temperature of blast means an increased smelting capacity of nearly 5% for the same furnace, with same blower running at the same speed, it is proper in considering the cost of hot blast apparatus to compare it with what would have been the increased cost in order to have obtained the same capacity with cold blast by increasing the size of the furnace, the blower and the power department, allowing this credit against the cost of hot blast apparatus.

A NEW property of matter has just been discovered—radio activity. Incidentally three new elements are also reported discovered—radium, polonium, actinium. All works on chemistry must necessarily be revised. As in the case of metallurgy and electricity, the doers, the discoverers, the creators are ahead of the chroniclers in books. The latest discovery by Henri Becquerel is the greatest since Roentgen's discovery of the X-rays. It may lead to greater results. Becquerel has found a new source of light—uranium—which is demonstrated to emit rays capable of passing through copper, a new property of matter ranking with heat, magnetism, light and electricity. This new property of matter is affected only by the density of the substance interposed: aluminum is to the Becquerel rays what glass is to light. These rays will themselves photograph the substance which emits them. As investigation goes on it is found that this newly discovered property of matter has intimate connection with electrical effect. So far the discovery and conclusions tend to confirm the oft-advanced hypothesis that all we designate as "substance" is resolvable into one—and only one—primitive form of matter.

PROGRESSIVENESS in mining is constantly illustrated in a variety of ways as the columns of this paper weekly attest. Even in weird and wondrous tales of "lost" mines, desert treasure, wood ashes assaying "away up" in gold, etc., there is noted advance and variety in the summer of '02 over the fanciful yarns of previous summers. This week from La Junta, Colo., comes allegation that the La Junta M. & M. Co. has found that the boiler scale in its boiler assays \$84 to the ton in gold. Granting for ordinary courtesy's sake that the statement bears a semblance of remote possibility, the process does not commend itself to practical metallurgists. Robt. McAllister, Colorado's State Boiler Inspector, is locally given as authority for the mid-summer fantasy.

Concentrates.

TALC of best quality is worth \$13 50 per ton delivered in New York City.

SPEISS has a natural affinity for gold, but less than that of copper matte for silver.

WITHOUT any definite prior agreement, machinery on a mine under lease and bond belongs to the lessee at the termination of the time for which the property was leased or bonded.

ASIDE from pure sperm oil, the best lubricant for a shaft journal is cold pressed, winter strained lard oil, as it embodies the two primo requisites of perfect lubricant, fluidity and viscosity.

WHERE a person guarantees a note before its delivery, the consideration for the note is the consideration for the guaranty, and no new consideration moving to the guarantor is necessary to support the guaranty.

POSSESSION of mortgaged goods by the mortgagee cures any defects in the execution or recordation of the mortgage as against the creditors of the mortgagor attaching such goods after possession has been taken.

THE average elevation of mining camps in New Mexico is about 5000 feet; their latitudes are from 32° to 37°; the climate is equable and mining may be carried on every day in the year without interruptions as the result of bad weather.

PURE GOLD melts at 1045° C., and, if kept at a melting point or slightly above, will not volatilize appreciably. When the temperature is increased above 1045° C. gold volatilizes. In case of alloy present, the gold is volatile at considerably lower temperature.

SPITTING is a term applied to a method of lighting a fuse quickly. The end of the fuse is spread and a small piece of dynamite is pressed into it. This fires readily and starts the powder of the fuse, which sometimes without the spitting refuses to fire as quickly as desired.

CEMENT can be stored for almost any time if care be taken to protect it from dampness. Much depends upon the manner in which it is packed, but so long as there is a good circulation of air through the storehouse, and the stock is well protected from the weather, there will be no difficulty experienced with cement, although it may have been stored several years.

A CASE IN POINT with that of the Butte, Mont., inquirer was that of Smith vs. Jones et al., reported 60 Pac. Rep., Utah, 1104, where it was held by the court that a contract by plaintiff to sell, and by defendants' predecessors in interest to buy, certain mining property, which contract is personal, and does not in terms run to heirs and assigns, and under which the prospective grantees, although given possession, could neither sell nor assign, without the grantor's consent, until they had become entitled to a deed by performance of certain conditions, one of which was to pay grantor a certain sum out of the property, is a mere option to purchase, with a license to extract ore, and not a covenant running with the land.

AN efficiency of 92% is somewhat high to allow in figuring on the work done by a pump, but placing the efficiency at 92%, a pump with a 6-inch plunger, and a 15-inch stroke, making sixty double strokes per minute, would have a speed of 150 feet per minute, and would handle 12,161 gallons water per hour. The speed is found as follows:

$$\frac{60(2 \times 15)}{12} = 150. \text{ The quantity of water}$$

$$\text{hourly pumped: } 60 \times \frac{.92(7854 \times 6^2 \times 150 \times 12)}{231} = 12,161.$$

THE breaking strain of a $\frac{3}{4}$ -inch plow steel, 6-strand, 7-wire rope is thirty-two tons. An inch rope would weigh 1.58 pounds per foot. Such a rope three-quarters of a mile long would weigh $3960 \times 1.58 = 6256.8$ pounds.

MONTANA MINING LAWS authorize a non-joining co-tenant of mining property to recover his share of the profits of the mine, or his proportionate share of all ores on the dump, on payment or tender of the costs of mining the same in a miner-like manner. In the case of the Butte & Boston Con. M. Co. vs. Montana Ore Purchasing Co. et al., 60 Pac. Rep., Mont., 1039, it was held that where defendant, a co-tenant, wrongfully worked a mine through shaft from another mine, in which plaintiff had no interest and to which he had no right of access, plaintiff was entitled to an injunction restraining defendant from continuing work on such mine, though he failed to render his proportionate share to the cost of mining the ore extracted therefrom, since such tender was excused by the plaintiff's inability to ascertain what ores it was entitled to in order to estimate the amount of such tender.

It pays miners and prospectors to advertise and talk about the resources and probabilities of the sections in which they are directly interested. If a mining district is worth anything at all, it is worth talking about, worth keeping before the public, worth discussing in print. If it has nothing to recommend it, if there is nothing but a few barren prospect holes there, the sooner the miner who is blowing in his money gets out the better. But if a district has merit and can show up good mineral and encouraging prospects, the men who are interested there should not hesitate to tell what they know about it. They should get their district before the public eye. Newspaper talk never has and never will sell a single mine. But intelligent newspaper discussion of a mining section

attracts attention, leads investigators to examine personally the mines of the district, and, if it proves satisfactory, then investment will follow.

STRESSES are the forces which are applied to bodies to bring into action their elastic and cohesive properties. These forces cause alterations of the forms of the bodies upon which they act. Strain is a name given to the kind of alteration produced by the stresses. The distinction between stress and strain is not always observed, one being used for the other. There are tensile, compressive, transverse, torsional and shearing stresses. A tensile stress or pull is a force tending to elongate a piece; a compressive stress or push is a force tending to shorten it; a transverse stress tends to bend it; a torsional stress tends to twist it; a shearing stress tends to force one part to slide over the adjacent part. To these may be added tearing stress, which is either tensile or shearing, but in which the resistance of different portions of the materials is brought into play in detail, or one after the other, instead of simultaneously, as in the first three.

WHY one pound of fuel is worth more or less than another, and which, of several samples of coal, is worth the most for fuel purposes, are questions the answer to which is difficult to give. It should be understood that all fuel is a combination of carbon and hydrogen in varying proportions, and ready, under suitable conditions, to combine with oxygen. It is in this act of combining with oxygen that heat is developed, and the fuel thus becomes of use for the purpose desired. Carbon and hydrogen, however, are far from having the same fuel value. One pound of the former under perfect combustion would develop about 14,500 units, while a pound of the latter under like combustion would give about 62,000 heat units, or more than four times as much per pound. The value will also depend on the amount of non-combustible matter, or ash, which is present, and on the nature and proportions of the various other ingredients.

In passing within the side lines of a claim, should the vein at any point along its length go out of or across the side line, then the point of exit becomes the end line, beyond which the owner cannot follow the vein into the ground of another. In regard to crossing or overlapping claims, whether extending across the claim at right or obtuse angles, the Supreme Court of Colorado has in late years reversed itself, so as to be in harmony with the decisions of the highest courts of other States, and with the Supreme Court of the United States, and now hold that the owner of such cross vein is not entitled to the ore within the limit of the area of intersection, provided his is the junior. The statutes award the later locator the right of way across the senior, for the convenient working of his mine, but the ore taken out in making the crossing will belong to the senior, provided he can show that his vein enters into and crosses beyond the junior side lines.

In the assay of copper materials for gold and silver the following is usually satisfactory: Dissolve 0.5-0.4 A. T. ore in dilute nitric acid, using small quantities at a time, add some sulphuric acid, evaporate excess of nitric acid, cool, add cool, then hot water, and introduce hydrogen sulphide for a few minutes until all the silver with only a little copper has separated out as a flocculent precipitate which carries down all the gold and is easily filtered; filter, and proceed in the usual way by burning filter and assaying the ashes. The filtrate must be tested for silver with a pinch of salt or a drop of hydrochloric acid. Another method: Dissolve one A. T. in dilute nitric acid, boil, filter, add to filtrate sufficient salt solution to precipitate all the silver as chloride, allow to stand over night, when pressed for time stir vigorously by hand (or better, by compressed air), filter, scourify silver chloride, gold and insoluble residue together, cupel. With some copper materials very low in gold the all-fire method is more satisfactory, as gold seems to go into solution. In this method ten samples of 1-10 assay ton each are scorified with lead until most of the copper has been removed, then united and cupelled.

A ROOF TANK 10 feet in diameter at the top, 12 feet in diameter at the bottom, having a depth of 12 feet, and fed by a pump discharging 150 gallons of water per minute, when the pump is started, there being a depth of water of 2 feet in the tank, it will take the pump forty-six minutes to fill. That part of the tank above the water level may be considered as a separate tank. The taper of the tank is 24 inches in 12 feet or 2 inches to the foot; the diameter at the surface of the water will have been reduced twice this amount at a depth of 2 feet, or 4 inches. That part of the tank to be filled is 10 feet diameter at top and 11 $\frac{1}{2}$ feet diameter at the bottom, with a depth of 10 feet. The volume or capacity of a tapered tank is found by multiplying the mean area by depth. The mean diameter is obtained by adding the diameter at the top and bottom and dividing the sum by 2. In this case the mean diameter is $11.66 + 10 \div 2 = 10.83$ feet. The mean area is $10.83^2 \times .7854 = 92.11$ square feet and the volume or capacity in cubic feet is $92.11 \times 10 = 921.1$ cubic feet. One cubic foot contains 7 $\frac{1}{2}$ gallons and the capacity of the tank in gallons is $921.1 \times 7.5 = 6908.25$. The pump supplies 150 gallons per minute, so that it will take as many minutes to fill the tank as 150 is contained in 6908.25, which is 46.

THERE are a great many points on gasoline engines that must be watched if one expects to get along all right. If he does not watch them trouble is sure to come, no matter how good an engine he may have. Gasoline engines are to a great extent automatic, and this has led

to a prevailing idea that they do not need any attention whatever. This is a great mistake. There is no machine which does not need to be kept clean, oiled, adjusted to take up wear, etc. Among the most frequent difficulties are obstructions in check valve in the gasoline supply pipe, which will then not permit the gasoline to flow regularly. Air holes in the supply pipe also cause this irregularity of the flow of gasoline. Weak batteries, damp spark coils, broken insulation in the igniter head, or encrusted tubelgniters are all causes of trouble. There are many such points, and it is only by thoroughly studying the engine, its operation and adjustments, so that the operator becomes familiar with the action of the engine, that he will be able to readily detect the source of the trouble and tell its remedy. When he does become familiar with the engine—and it does not require an excessive amount of time or ability to do so—he will find that there is no better power to be secured than he has, and he will wonder why he ever had any trouble at all with it. The secret of it all is: "Know your engine."

WHERE a patent issues for public land under a law which provides for its disposition as agricultural land—either to a railroad company or to pre-emption or homestead claim—and there is no reservation in the law except a general one of mineral lands, and no reservation at all in the patent, then the patent must be considered as a conclusive determination by the Government that the land is agricultural. It is a rule of law that a defendant may defeat an action of ejectment by showing that plaintiff has no title, in that his patent is absolutely void. But yet where a patent, regular on its face, has been issued by the Government for land which it owns under a law providing for the disposal of the land patented, upon the ascertainment of certain facts (as to whether it is mineral land or adapted to agriculture) the officers of the Land Department of the Government have jurisdiction to determine such facts and the issuance of a patent is upon collateral attack (that is, otherwise than a suit brought for the single purpose of setting the patent aside on the ground of fraud or mistake) a conclusive declaration as against all claims under the Government, that the facts have been found in favor of the patentee. This applies as well to State as to United States patents. The plain meaning of this is that the judgment of the Land Department whether a certain tract is swamp land or not, one way or the other, is conclusive and not open to legislation in courts except in those cases of fraud, etc., which permit any determination to be re-examined.

ANY ONE wishing to have gold or silver assayed in quantity, or wishing to sell it to the Government, may present his property at the U. S. mint at San Francisco, Cal., the assay offices at Seattle, Wash., or Denver, Colo., where he may have the metal reduced and made into bars, or, if he prefers, he may sell his bullion direct to the Government. The charge for doing the work is merely nominal, and is based on the actual cost. When the metal is received, the first step consists in weighing the coin, bars, etc. This is done with great exactness and a receipt is given. Each person's holdings are placed in a box and are taken to the melting room, where they are placed in crucibles with a flux, smelted and cast in ingot molds. A small chip is taken from the bar for assay. The chip is taken to the assay room, where a hydraulic press reduces the sample to a size which permits of it being run through drawing rollers, so that the sample may be cut from the ribbon with the weight of one gram. This is placed in a small unglazed cup (a cupel) and a known quantity of silver, copper and lead is added before firing, for the following reasons: The function of the lead, which is in the form of a thin sheet, is two-fold; first, it serves as an envelope to hold the particles of bullion, silver and copper together while melting, and the lead also oxidizes freely, dissolving the copper oxide and making it possible for both oxides to be absorbed by the porous body of the cupel. Silver is added so that the proportion of silver in the sample of bullion shall be approximately two of silver to one of gold, and that in the subsequent acid bath the gold shall not surround or mask the silver, so as to prevent it from dissolving. In cooling, the button which remains in the cupel after firing is apt to spurt up, thus wasting a portion of its weight and destroying the value of the assay. The lead oxide assists the copper oxide to be absorbed by the cupel. The cupel and its contents are now placed in a muffle furnace, and heated for a period to insure complete melting. If there be any copper or lead present in the sample, they will become alloyed with the copper and lead added by the assayer, and will become oxidized and absorbed. The gold and silver, together with the known quantity of silver which has been added by the assay office, remain in the cupel in the form of a button. Each button is placed in a special tray, which keeps each sample by itself, and is then flattened and rolled, hotted in nitric acid, 32° Baume, for ten minutes, and then in fresh acid for ten minutes more. The silver is dissolved by the acid, forming silver nitrate, while the gold remains intact, because only nitro-hydrochloric acid dissolves it. Gold is left in the flask and is washed and weighed. The loss of weight in the furnace is base metal—lead and copper. The loss of weight in the nitric acid is silver and the remainder is gold. In the case of silver bullion it is subjected to the humid test as well. So far the Government has been acting as an assayer, but if the depositor wishes to part with his bullion, which is now of known value, the Government pays for it at the prevailing price and proceeds to separate or part the gold from the silver. The price of gold varies—\$20.67 ounce fine. Silver fluctuates with the market.

Live Foundations.

Written for the MINING AND SCIENTIFIC PRESS by C. H. FITCH.

The foundations discussed in previous articles may be described as "dead"—that is, mere supporting foundations, without resilience and vibration enough to be considered.

The end to be served in them was a spreading of the load. It was a question of pressure between a stronger and a weaker material, the whole requirement being, as was modestly said by the man who wore the skull cap, "to protect the weakest member." This protection to soft soil can only be obtained by spreading the pressure over a large area so as to lighten it per unit of area. And this diffusion of pressure is most effective at right angles to the general direction of pressure, which is vertical. Hence, the seat of pressure should be as large as necessary and practically horizontal. Nothing is gained by forms of penetration which have foundations upon other than a flat horizontal plane, except those inverted saucer or umbrella forms which balance pressures against side displacement.

But foundations which resist a live force call for a different theory. They have to stand such hammering as is made by unbalanced forces in locomotive driving wheels upon the rail and the hammering of stamps upon dies and mortar blocks. They must take up inertia.

But in milling gold ores under gravity stamps and in milling copper rock under steam stamps, the rebound or reaction was of course recognized and some theories were advanced without clear definition or good reason, attributing to this rebounding action some advantages in pulverization. The idea of these theories was that the blow delivered by the stamp on the ore passed through it to the anvil, and the latter struck back again, pulverizing the ore, which caught the blow going and coming—very much like the darky's animal trap. Action and reaction are equal. Anyone who discharges a gun or strikes a heavy blow with axe or sledge feels the reaction in his own person.

The idea that an elastic reaction helped crushing took hold of the imagination of mill men and engineers, including some very eminent ones. Gold stamps were given a timber base having considerable spring, and the large copper ore stamps by Ball of Chicopee, Mass., and later by E. D. Leavitt of Cambridgeport, Mass., for the Lake Superior mines, were constructed with special spring timbers. As the athlete is thrown into the air by the springboard, so was it understood that the mortar and die was thrown against the shoe, giving the ore between them an additional squeeze. The mind of man is in nothing more wonderful than in its logic, and from this point the conclusion was jumped at that more ore would be crushed with spring timbers, whereas in fact the spring blow cut the capacity in two, substituting an elastic movement for a pulverizing shock. Given motion enough of this kind, the power can be passed to and fro through ore without crushing it at all.

Still our wise engineers' eyes remained as unopened as those of new kittens, and in works costing many thousands of dollars spring timbers were always specified. For many years this little point was never thought out. It was taken for granted that what was specified by engineers supposed to be highly educated in theory, and huilt at machine shops of the widest reputation by men of the largest practical experience, must be superlatively correct and not to be questioned. Thus, one supposition leans upon another, like a row of bricks, the fall of one of which precipitates them all.

But it was an eminent engineer, now president of the American Society of Mechanical Engineers and chief engineer of the Allis-Chalmers Co., who detected the faulty theory. Edwin Reynolds turned the thing over in his mind and concluded that it was best to make the pulverizing blow as free from flexure and vibration as possible. If he had been a theorist only, the engineers who had a gap of guesswork in their theories might have safely laughed at him. But, as he was himself an engineer of large responsibilities, he was able to try it upon large and expensive works while others watched to see how he would come out. The result was that the capacity of the large Lake Superior stamps jumped from 200 or 250 tons to 400 or 500 tons a day—in fact, nearly doubled—largely due to this change. Now the idea is being applied to gold stamps by the use of heavy iron anvils. These never had such timbers as the copper stamps, and the room for improvement was less, but about 25% gain in capacity is claimed.

I think it of historic interest to reproduce the following letter:

MILWAUKEE, WIS., Feb 8, 1898.

MR. C. H. FITCH, 124 SO. GROVE AVE., OAR PARK, ILL.—DEAR SIR: Yours of the 5th received. The mortars of the Lake Superior stamps were placed on spring timbers until I designed a stamp to do away with the timbers and substitute dead weight in their place. I was criticised for presuming to do such a thing by every stamp mill engineer in the country that I came in contact with, Mr. Leavitt included. But my "foolish experiment," as it was termed, resulted in increasing the capacity of the stamps nearly 50%, 200 tons a day being considered an extraordinary performance for the best stamps until mine was put in use. The first week's record

made by my stamp after the condenser was attached was 1920 tons in six days, and I think some of them have records averaging 300 tons per day for the entire year. The first machine was that for the Tamarack Mining Co., and the results obtained were so satisfactory that all stamps in the Calumet & Hecla, as well, I understand, as all other mills, have been changed over, abandoning the timbers. I do not know of any public discussion on the subject, as I have no time to devote to such matters.

Yours truly, EDWIN REYNOLDS.

The condenser to which reference is made obtained the usual increase of power by vacuum, and, as before stated, the capacity of these stamps was increased to 500 tons in twenty-four hours, and the large part played in this increase by change from spring timbers to solid foundations is unquestioned. Now no one would put in spring timbers.

This is such a lesson to us to do our own thinking and not to trust to the reputed wisdom of authorities that I give in full the foregoing letter, showing the way in which a novel suggestion was received. The fallacy which held its ground so universally a few years ago is now seen to have no reason at all in sound theory. I believe that there are quite a lot of fallacies as pronounced as this still doing business in mining and metallurgical circles and thought—in other words, theory is required to ferret them out.

Practice goes on doing what its grandfather did: loading its mule with a sack of corn on one side and a stone on the other. Few men are great thinkers. In mechanical engineering W. J. M. Rankine was one—almost the one—for, while a wide range of new applications has arisen since his time, the whole profession has kept safely within the comprehensive ability with which he diagnosed engineering facts and drew from them a sound and far-reaching code of theory.

Copper in Northern California.

NUMBER II.—CONCLUDED.

By J. S. DILLER.

Bully Hill district: The Bully Hill district, including also Copper City, has been developed within the last few years under the efficient management of A. H. Brown. The arrangement for mining and handling the ore to the roasting bins, furnace and converters are excellent. Two converters were in operation last July, yielding about sixteen tons of copper daily, and one or more converters have been added since, indicating a good outlook.

In Bully Hill there are a number of zones containing ore. Only two zones are of importance—one in quartz porphyry (Bully Hill quartzite), and the other in a highly altered keratophyr. Although the main ore body in places appears to come in contact with the quartz porphyry, it is most intimately associated with a keratophyr, which contains more or less silica and more lime. The ore bodies mined were nowhere seen in the Triassic shales, but such shales with radiolaria occur in the tunnels a short distance to the eastward of the main lode. The general strike of the shear zones in which the ore bodies occur is from nearly N. to N. 10° E., with steep dip to the westward. The ore bodies are flattish, lenticular of irregular outline, and range in size from mere nodules to bodies hundreds of feet in length. The ore was seen from 4 to 12 feet in thickness, and the walls are often, but not always, well marked. Generally on the foot wall there is a white selvage, which, according to George Seitzer, contains Na₂O 20, K₂O 3.28, and H₂O 11.87, and appears to be a mixture of sericite and kaolin. It is very irregular, ranging from a mere film to 12 feet, and is used for lining the converters in the smelter.

The ore bodies are solid and composed of pyrite and chalcocite usually, with a greater amount of chalcocite and occasionally hornite, with traces of the carbonates and native copper. Sphalerite and barite are generally present and frequently more abundant than the other minerals. One body of ore is said to have assayed 15% copper, \$8 in gold and six ounces silver per ton. Where the ore is largely chalcocite, the content of copper is high, sometimes reaching over 46%, but the general range is said to be about 10%.

In the Copper City mines the ores are of the same nature as Bully Hill, but inclosed wholly in the sheared quartz porphyry. The shearing gives to this igneous rock the appearance of slate, but under the microscope the two are in general easily separated. The quartz porphyry passes into sericite schist in the shear zone, and is more or less heavily impregnated by sulphides, showing stages from partial to complete replacement.

The lode at Copper City runs north 50° east, and the lenticular bodies range in thickness from a mere film or nodule in the fissile schist to 5 feet or more in thickness and many feet in length. Sphalerite and barite are as abundant in the ores at Copper City as at Bully Hill.

Iron Mountain District: The largest and most important district of the copper region, as far as known at present, lies west of the Sacramento river and extends from Iron Mountain a few degrees east of north for nearly 20 miles to the Shasta King, near Kennett. The Iron Mountain mine is under the management of L. T. Wright, who has with diamond drill done more than any one else to get an accurate idea of the ore bodies and their distribution in the

district. The Iron Mountain mine is marked upon the surface by a prominent gossan of limonite, which in the early days was mined for gold and silver. In places the gossan extends to a depth of over 100 feet, changing abruptly from the oxides to the sulphides, but upon the steep slopes bordering the canyons the gossan has been removed and the bodies of sulphides lie nearer the surface.

In the Iron Mountain vicinity there are two principal bodies of ore—one the Iron Mountain and the other the Hornet. The Iron Mountain ore body is now being mined, and the large Hornet body has been thoroughly prospected. The ore appears to be wholly pyrites, carrying copper, with an admixture of chalcocite. The dark sulphides so common at Bully Hill are practically absent in this body, although at certain points in both the Hornet and Iron Mountain ore bodies there is considerable zinc, and the arrangement of the zinc in streaks gives the ore a schistose structure, which is referred to on the one hand as evidence that the bodies are true vein deposits, and, on the other, that the structure comes from the replaced schist. Quartz is often present. Barite is absent.

The ore bodies are cut by small transverse faults, their sides occasionally polished by movement since the ore was deposited. In the Iron Mountain district the ore separates easily from the wall rock, and at many points there are considerable masses of sericitic selvage, but none so large was seen as in the Bully Hill mine. The wall rock on both sides of the Hornet is quartz keratophyr, which, according to Hillebrand's partial analysis, contains 5.16% Na₂O and only .30% K₂O, with .015% BaO and 74.52% SiO₂. It looks quite like quartz porphyry, but differs especially in containing more soda. It seems to be related to the soda rhyolites, described by Palache, near Berkeley. Over 700 tons of ore yielded an average of 7½% copper, with a range of 1% to 20% copper.

Shasta King: At the northern end of the Iron Mountain district is the Shasta King mine, which is rapidly developing and is about to erect a smelter. The ore body is in the form of a sheet, with its greatest dimension north and south, dipping gently to the westward, in strong contrast with the other ore bodies of the district. A selvage of sericite, from a mere trace to nearly a foot, generally separates the ore and country rock. At one point upon the upper side the ore appears to be "frozen to country rock," but this is exceptional. Near the surface a well-marked gossan of limonite, like that of Iron Mountain, prevails, but is less extensive, on account of the steep slopes.

The ore is almost wholly pyrite and chalcocite, with some sphalerite.

Balacala: A short distance south of Shasta King and 1000 feet above it is the Balacala. In both cases the rock appears to be keratophyr, generally quartz-bearing, and the ore bodies strike nearly parallel; but at Balacala the dip is steep to the west. The ore body, which consists chiefly of pyrite, with some chalcocite, although irregular, is large and dips nearly parallel to the slope of the ravine, so that short tunnels reach the ore. Gossan is rare on the steep slopes, but farther northeast, where the mine was first opened, on a gentle slope east of Shasta King, gossan rich in limonite is prominent. Upon the borders of the ore bodies small nodules more or less lenticular occur in the schistose quartz keratophyr, and appear to illustrate in a small way the relations of the large ore bodies. They are composed of pyrite and have no selvage. King Copper, Spread Eagle and a number of other claims in the same district are rapidly developing. In the Bully Hill and Iron Mountain districts great depths have scarcely yet been reached, but enough is known to suggest that secondary enrichment has played an important role in these deposits.

Gasoline Engine and Dynamo.

TO THE EDITOR:—In "Concentrates," July 19, regarding the running of a dynamo by a gasoline engine, you recommend that there be provided a heavy balance wheel or a countershaft with a heavy pulley upon it, and that it would probably run steadily enough for such a purpose.

Some fifteen years ago I had occasion to install an incandescent plant of twenty-five sixteen candle power electric lights in a Chicago restaurant. The power was furnished by gas engine, 140 revolutions per minute, the dynamo 2300 per minute. I first tried the heavy balance wheel on the engine. The impulses due to the explosions in the gas engine showed very plainly in the lights. I then introduced the rope transmission system, using a heavy pulley on the take-up carriage. This proved no better than the first method. Finally I placed a heavy balance wheel on the dynamo, on the armature shaft. The wheel consisted of a hub, from which to the rim in place of spokes the web was solid, about ¾ inch thick, and accurately balanced. This wheel was 26 inches diameter. A heavy rim added 4 inches to the radius and was 3 inches thick. As the dynamo had 2300 revolutions per minute, every impulse of the engine, which was belted direct, was absorbed by the balance wheel at its high speed, and perfectly steady lights resulted. The higher the speed the less the impulses will interfere with the regularity of that speed under these conditions.

C. W. R.

“Miners’ Wages in Mexico.”

TO THE EDITOR:—One sees so much printed in regard to Mexico that those who are familiar with the conditions of the country know to be erroneous that it is impossible at times to let the error go uncorrected.

Under the above caption is found an article in the MINING AND SCIENTIFIC PRESS of June 28, 1902, copied from an Arizona paper, that conveys much information that is, to say the least, misleading; and I speak from the standpoint of a seventeen years' residence in the country, in the States of Chihuahua, Sonora, Sinaloa and Durango.

Why the Mexican miner receives in silver about what the American receives in gold is due to none of the causes mentioned in the copied item referred to, but is due to the fact that prior to the establishment of works by foreign companies the native, as a rule, had been accustomed to a salary of 25 cents a day, in goods, in the agricultural districts, and to \$1 per day, in store supplies, in the mining districts; so that when the new works are started up and the pay is raised to \$2 and over, and often the whole or half in cash, the native thinks he has fallen into the seventh heaven, as it were, and is content, even if foreigners get double for doing the same work.

The ethical side of the question is liable to be insisted on by the foreign manager upon first coming into the country and learning how the workers are treated by their native employers.

The conditions are entirely different from what one finds in almost any other country in the world, and the people—the working classes—are the most peaceable and easiest satisfied of any similar class on earth.

The climate is such that the native needs but little besides his food and the simplest of clothing. He is very poor, accustomed to live in a hut with no furniture and but the scantiest of kitchen service, and, prior to the coming of the foreign company, putting up with the scantiest amount of food, mostly corn, beans once in a while, and, less often, beef.

In justice to the country I will say that these conditions are gradually disappearing, even where the works are owned by natives.

What is the wonder, then, if under the new conditions the native miner is enabled to live as he never dreamed of before, that he is contented, even if others do get more?

Having been raised with no wants, the present generation does not know what to do with the great (to them) surplus earned under the new conditions; for it is a well-known fact, to those of us who are familiar with the people, that when the native finds himself with money to spare the last thing he thinks of is getting something of use to his family, saving it or supplying himself with something a foreigner would consider indispensable. If the surplus is not spent in debauching, our native buys himself a gold-trimmed “sombbrero,” a revolver, or some other such piece of furniture.

Viewed from the ethical standpoint (and I say so after a most intimate association with the subject, having worked him successfully both for Mexican and foreign companies), every cent paid the native workman of the present generation, over and above the actual needs of the day, really does him an injury, in that it foments latent vices that in a very few years ruin the man whom we have started out to better.

I call to mind several cases, in my own experience, where I have taken special interest in bright young fellows who by their work forced themselves upon my notice. Some of them I pushed ahead until they were earning \$4 per day, and invariably it was their ruin. Instead of saving, as one would expect, it would not be long before they would be spending their salary and working their credit to the limit—gambling, drinking and all other excesses. The result was that in two years they were worthless.

In each of these cases the men were all that could be expected as long as they received good living pay, or say about \$2 silver per day.

The fact is that in an experience of nine years as a mine manager, using natives exclusively, I only call to mind two who saved money out of their wages.

In all my experience I have yet to call to mind a single case where the company had to pay a cent—involuntarily—for a man killed, or to his relations. The authorities, it is true, take due cognizance of the accident; but where it is a case of pure accident that could not have been avoided unless the victim had stayed out, no fine is ever imposed, nor do the families ever demand anything. However, companies that I have been connected with have always done something for the family; though, even then, \$100 is the largest amount I call to mind as having been paid.

Perhaps the Green Co. has some special contract with the Mexican Government, otherwise I very much doubt the Government's fixing the rate of wage to be paid to the native miner. That statement is contrary to my experience, as I call to mind no such interference, and I have been connected with some of the largest mining companies in the country.

The native workman is, as a rule, one of the most peaceable of mortals; and although he frequently, when under the influence of mescal, will think he is

COST OF COKE PER TON (2000 lbs.)

0 \$5.00 \$10.00 \$15.00 \$20.00 \$25.00 \$30.00

A B C D E

Coal \$0 \$5.00 \$10.00 \$15.00 \$20.00 per Ton (2000 lbs.)

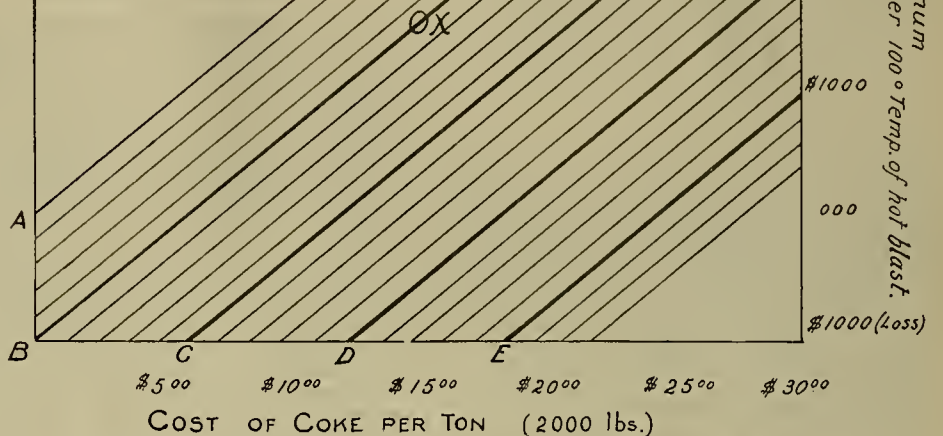
Oil 0 \$1.25 \$2.50 \$3.75 \$5.00 " bll

Wood {WHITE OAK} 0 \$4.00 \$8.00 \$12.00 \$16.00 " Cord

Wood {mixed} 0 \$3.00 \$6.00 \$9.00 \$12.00 " "

Wood {PINE} 0 \$2.00 \$4.00 \$6.00 \$8.00 " "

Diagram 15



COST OF COKE PER TON (2000 lbs.)

MINING & SCIENTIFIC PRESS.

Diagram Illustrating Editorial on “Value of the Hot Blast in Smelting,” Page 70.

the best man on earth, and sometimes get killed for entertaining that idea, nevertheless, it is a well-known fact that he is never a revolutionist. He is a follower in that line, as he is in every other; he is never a leader.

The average Mexican miner will drill, in ordinary rock, 8 feet of holes in a shift, for which he will get about \$2.

The class of American miners that can be gotten on the immediate frontier are the equal of those to be had in the interior of the United States, and no doubt are superior to the average native; but my experience has been that the miner to be had along the west coast is a good man to keep out of your mine if you have a full crew of natives.

In nine cases out of ten where we have put the more intelligent (?) foreigner in charge of a piece of work, instead of taking hold as he would have to in the States, he does little, and, if allowed, will soon press one or more of the natives under him to wait upon him, which the native will do without questioning, so used is he to obey those over him.

Where foreign companies will confine themselves to good, high-class foreign foremen who speak the language and use natives elsewhere, paying a reasonable wage in silver, they will get along far better than by trying to use foreign labor entirely.

A fact that will ere long confront industrial enterprises in Mexico will be the lack of native labor of any kind to supply the demand; and it will not be many years before recourse will have to be had to immigration, and the Chinese seems to be the one most adapted to the country at present.

E. A. H. TAYS.

Identification of Metals of the Platinum Group.

Sodium peroxide at a dull red heat is the most suitable reagent. The metal, which should be in an extremely finely divided state, is mixed with five or six times its weight of sodium peroxide and gently heated in a nickel basin over a low gas flame. The mass first blackens and then becomes pasty, after being stirred with nickel spatula, and the heating continued, it becomes semi-liquid. The flame is withdrawn, and the cold contents of the basin treated carefully with water in the proportion of about ten to twelve times the weight of sodium peroxide used. The mixture is transferred to a tube, and after standing, the clear liquid is decanted, and the deposit mixed with water and collected on a filter. The oxide of nickel found will be in this deposit, and if insoluble oxides of insoluble alkaline salts of the platinum group are also present it can be readily separated from them by means of the nitrate method. The separate metals treated with sodium peroxide

in this way give the following results:

Osmium is completely converted into sodium osmate, which dissolves in water yielding a yellow solution. On passing a current of chlorine through the solution, slightly heated, osmium peroxide can be collected in a receiver immersed in ice water. This compound may be identified by the formation of potassium osmate (action of potassium nitrate on heating or of alcohol and potassium hydroxide in the cold).

Ruthenium is completely converted into sodium peruthenate, which in the presence of water yields the ruthenate. The latter forms an orange solution which on treatment with chlorine gas as above yields a yellow liquid, in which ruthenium peroxide may be identified by the reduction of ruthenium on treatment with caustic potash and alcohol in the cold, or by the formation of a brown sesquichloride, by the action of hot hydrochloric acid.

Palladium gives an alkaline palladate soluble in water. On neutralizing the yellow solution with hydrochloric acid and then evaporating it after addition of chloride of potash and nitric acid, ruby red crystals of potassium chloro-palladate, insoluble in a saturated solution of KCl, are formed.

Iridium is converted into hassic irridate, which on treatment with water yields a blue solution. On adding a slight excess of hydrochloric acid to this solution, and evaporating after the further addition of KCl and a little nitric acid, black crystals of potassium chloro-iridate are obtained. These are also insoluble in a saturated solution of KCl.

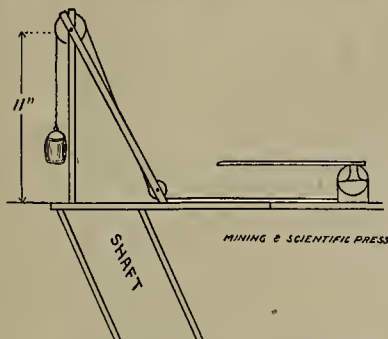
Platinum is converted into the insoluble sodium platinate which remains on the filter with the nickel oxide. The precipitate is dissolved in strong HCl, the greater part of the acid subsequently evaporated and sodium nitrate added until the liquid is neutral, then sodium carbonate, and the liquid boiled and filtered. Nickel carbonate remains on the filter, whilst the filtrate contains the double nitrate of platinum and sodium. On evaporating this filtrate to dryness, after adding HCl, the residue is dissolved in water and treated with ammonium chloride, it gives the characteristic crystals of ammonium chloro-platinate.

Rhodium is converted partially into dioxide, soluble in hot concentrated hydrochloric acid, and partially into sesquioxide, remaining undissolved. The filtrate obtained by treating the mass with hot concentrated hydrochloric acid will also contain the nickel. It is treated in the same manner as the platinum solution and filtered with the nickel carbonate. On heating the filtrate with an excess of hydrochloric acid it becomes rose-colored from the formation of the double chloride, but does not yield a precipitate with ammonium chloride. — Bulletin Soc. Chem., XXVII.

Automatic Dumping Device.

Occasionally "Concentrates" is asked a question that no amount of compression or boiling down of the requested answer will permit of its appearance on that page. Of such a nature is the following:

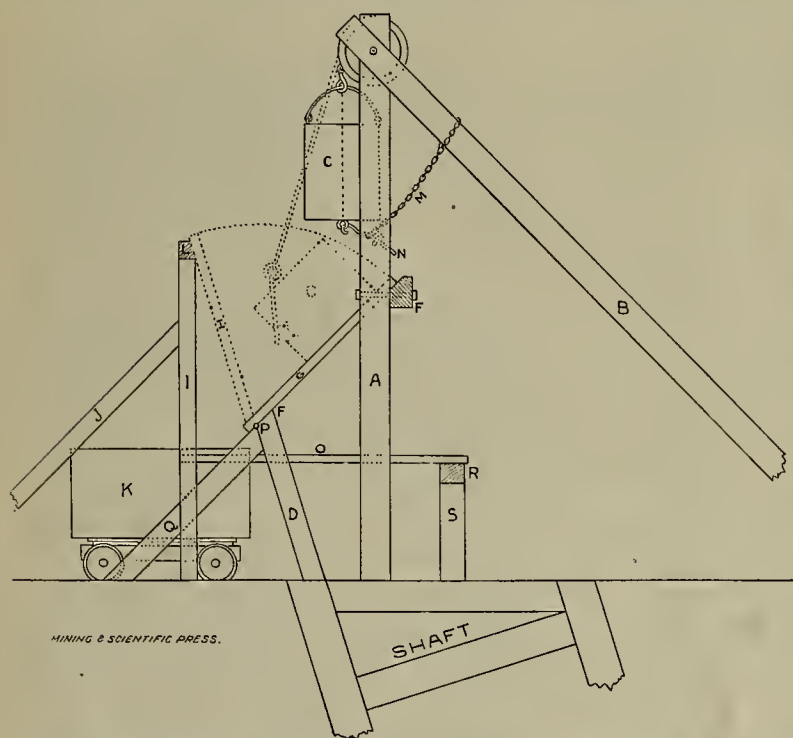
As a subscriber and an admirer of your paper it has occurred to me that "Concentrates" may be willing to furnish a pointer in a matter which has stumped me for some time. The question is this: On my prospect I am hoisting in a 73° incline with buckets (No. 6), the hoister being a No. 1 Davis whim. My gallows-frame is of the tripod style, the two front standards being perpendicular, as shown in sketch. From the shaft collar to the sheave there



is 11 feet clearance, and what I want to know is how to rig up some kind of an apparatus with which to dump the buckets automatically. Up to the present we are lowering the buckets to the ground in front of the incline, disengaging the safety hook and chain and dumping the buckets by hand, and we find it slow and laborious work. If "Concentrates" can help me out with any practical suggestion in the line asked for I shall appreciate it very much.

Ocotlan, Oaxaca, Mexico, July 1, 1902. T. G. F.

Having the tripod hoisting frame renders our Mexican prospector's problem more difficult of solution than with any other type of head frame. The accom-



panying sketch may be of some assistance to him, being merely suggestive, as all the conditions and dimensions are not known. By extending the skids of the shaft upward, as shown at D, and arranging a door or apron over the shaft, as at G, the bucket may be dumped upon the door, as at C. M is a trip rope or chain secured to the back brace of the frame B. F is a cross piece secured to the triangular legs of the frame A, and upon this the apron rests when down. After dumping the bucket, the contents of which fall into the car K, it is hoisted up to the sheave, as at C, the trip hook N disengaged, the door thrown back to its position H, swinging on a strong hinge P. When in this position the door rests upon L, which is supported by two posts I, between which the car track is laid. J is a back brace supporting this frame. The labor of moving the door in either direction may be lessened by attaching a counterbalance, the rope passing over a small wheel

attached to L. The back brace Q is to give support to the extension skids D. The entire scheme is operated by a man standing on the platform O, which is secured to I, D and R, the latter being a cross piece resting on two posts S. Should the diameter of the bucket be too great to pass F, a block may be placed between A and F, but this will require a longer door and the bottom of the bucket may not clear it when hoisted as high as it will go. A larger sheave would help in this case. The above is figured on a bucket having a height of 28 inches. If necessary, the door may have side guides to keep rock from falling into the shaft, which must be avoided at any cost. A low car must be employed, as the height of the bottom of the door is but 3½ feet above the collar of the shaft. If the hoisting gear were placed on the foot wall side of the shaft, and the entire frame turned around, the above scheme might be made to operate successfully, dumping on a flat platform, under which the car may be run.

Drilling for Gold Dredging.

Written for the MINING AND SCIENTIFIC PRESS.

I would recommend a 4 H. P. boiler and engine—upright preferred, steel boiler capable of carrying 100 pounds of steam, iron wheels, extra wide tires, to admit of being drawn on wet or marshy ground, total weight about one ton. If found necessary, engine can be detached, also boiler; nothing less than a 6-inch bore to be drilled, driving stem to weigh, with drill, not less than 700 pounds. For ordinary purposes a 22-inch stroke answers well, with from forty to sixty strokes per minute. Casing should be 6-inch, extra heavy, with special coarse threads, ends of all casings cut perfectly true in a lathe, so that the blow will come against the ends of casing instead of on the thread. The casing should be cut in 5-foot lengths, and there should be plenty of couplings, so that in case of one getting bruised or lost another can be quickly replaced. A special steel drive shoe is necessary, with taper shoulder, so as not to catch when being withdrawn. A square shoulder will catch against the edge of a rock and cause trouble in getting it out. The best steel should be used for making the drive shoe.

It is important in drilling to keep the casing well down, and this sometimes requires hard driving, but with a good drive shoe and good, strong casing and good threads no trouble will be had. For all ordinary work 40 feet of casing is sufficient. There should be four drills, plenty of the best rope, with a good tackle block, using ¾-inch rope. This is especially useful in drawing casing. A good sand pump with special independent drum and friction for working the pump are essential, so that the drill can be taken out and the well pumped out in a few minutes. A box of 2-inch plank, 4 feet square by 1 foot deep, is well adapted for holding the material as it is pumped out. This should be fastened to runners, thus making a store box for transferring tools, etc., from one place to another. A

12-inch fan should be attached to the outfit, to be driven with the engine, and a piece of 2-inch rubber hose for blowing the fire when sharpening the drills. With this fan and hose a good fire can be made by digging a hole in the ground and using wood or coal; plenty of heat can then be had for tempering heavy drills. An anvil should also be included, and a good sledge, a good machine hammer, a claw hammer, plenty of good chains of the best quality, saws, chisels, blacksmith tongs, and a few pieces of wrought iron and tool steel, 50 feet of best quality ¾-inch hose, extra injector, different sizes of machine bolts, nails and screws, two good jackscrews, crowbars, a piece of good, hard wood suitable for pins, handles, levers, etc., a five-gallon can of machine oil and some cylinder oil, two galvanized pans and one tub. Three good men will drill a hole in two days on an average, and do all the necessary moving, and will thoroughly prospect a good-sized claim in a few weeks.

CALIFORNIA's average annual gold output for the last fifty-three years has been about \$25,000,000.

The Pachuca Stamp Battery and Its Predecessors.*

M. P. BOSS, Pachuca, Mexico.

Of the two methods of mechanical reduction—that of percussion and that of abrasion—it is not easy to say which was first employed by primeval man. The stone hammer and the flat or hollowed stone used for grinding are found together in the remains of prehistoric periods. But the use of the mallet, or bucking stone, developed from the hammer, was probably introduced later than that of crude millstones. Diodorus Siculus, the Roman historian of the first century B. C., mentions such millstones as used in the mines of Egypt to pulverize material which had been previously broken in a mortar.

The invention of the arrastra for fine grinding is declared by some authorities to have been made by Bartolomeo de Medina, at Pachuca, Mexico, about A. D. 1557, which is quite probable. Being the first to amalgamate silver on anything like a business scale, he must have felt the necessity for ore grinding apparatus of greater capacity than the old primitive millstones, and the arrastra was thus the natural successor of the millstone.

It is very unfortunate that the archives of Pachuca, which have made so much history in ore treatment, were destroyed in some one of the many insurrections for which, also, the place is renowned.

The first application of the stamp to the crushing of rock is asserted by some writers to have been the invention of a Saxon nobleman named Von Maltitz, about the year 1505. Better authenticated reference, however, is made to one Paul Gronstetter, a native of Schwarz, and called an ingenious worker, who, in the year 1519, established at Joachimsthal a process of wet stamping and sifting. Two years later a larger plant was established at the same place. It is said that he had previously introduced the same device at Schneeberg. How much of the invention was due to Gronstetter is not certain; but it certainly seems that he was the first successful operator, and that it rapidly came into extensive use, as a direct result of his operations.

Whether the stamp mill was then practically as we find it profusely illustrated in the work of George Agricola, some years later, or whether it had been further developed by other hands in the interim, we are not informed. But for more than 300 years the stamp continued to be a square timber (except in a few instances where square iron was used) with an iron shoe at the lower end. In this form it came to crush the first gold ore of California.

As soon as stamps began to fall on California gold quartz, brains began to work for their improvement. There was in those days so little system and so much crudeness of construction, as well as secrecy of methods, that the early improvements can be traced with difficulty. Previous to the general adoption of the round revolving stamp, numerous departures had been made from the original imported type. One style came into vogue in the territory around Marysville, Cal. It was square, and had two stems, driven with a taper into the head, and the rectangular tappet was held by cross keys, one for each stem. The stems were cross-slotted to engage the keys. Some of these stamps weighed as much as 1000 pounds each. The shoes were held by a square taper shank.

An article of considerable fullness, by C. P. Stanford, in the San Francisco MINING AND SCIENTIFIC PRESS of October 21, 1893, shows conclusively that that gentleman was the inventor of the round stamp; but it was not made to revolve until this feature was suggested by Isaac Fisk, an engineer in his employ.

The United States patent granted July 4, 1854, to Joseph L. Laird, for an improvement in ore stamps, claimed "the arrangement of the lifters by being so placed as to operate on the periphery of the tappet head for the purpose of giving the stamps a partial rotation without requiring other mechanism in the manner set forth." This inventor very likely found his patent invalid for lack of novelty. At all events, no instance can be found of his claiming royalty for the thousands of stamps which were in use, with this improvement, during the life of the patent.

After the introduction of the round stamp, Zenas Wheeler devised a means of holding the tappet by screwing it upon the stem. Later, when having a large stamp mill built at the Miners' Foundry of San Francisco, he accepted the advice of H. B. Angel and had it made with a gib and two cross keys in the tappet. Years later, Irving M. Scott cast the gib into the tappet, making it shorter and entirely enclosing it at the ends, thereby securing it against maladjustment, as well as simplifying its construction.

In 1857 Samuel J. Black, complaining of the faultiness of all cams hitherto made, requested H. J. Booth of the Marysville Foundry to make a cam that would at all times bear only on a diameter line of the tappet parallel with the cam shaft. Mr. Booth got the lines for such a cam by means of a board revolved upon a center corresponding with the cam shaft center, locating his points with a dummy tappet, working upon a slide. Of course, this gave practically an involute curve. The first double-arm cam, made as they are to-day, with the hub on one side, to

*Trans. Am. Inst. Mining Engineers.

bring the stamp nearer to the shaft, and laid out as an involute, was designed by Irving M. Scott.

The high box mortar is thought by some to be due to Zenas Wheeler; but positive information on this point is unattainable. Nor is it to be ascertained to whom is due the introduction of the long battery foundation blocks, set on end.

This outlines the evolution of the world-famous California stamp battery. It has continued, and still continues, to undergo a gradual refinement of detail, and it has become cosmopolitan.

Judged from the standards of the present day of technical schools and highly developed mechanics, the evolution of the California stamp seems but a trivial and simple matter; but at that time it was an important step up the ladder of progress.

Sixteen years ago the writer became an advocate of concrete foundations and low-set guides for stamps and three years later took the opportunity to apply these principles to the original Hacienda de San Francisco de Pachuca.

This first foundation, however, was not an unqualified success, the concrete having been insufficiently rammed; but it was a guiding star for the erection of the new Hacienda de San Francisco, built at Zotol. This mill began crushing ore May 1, 1894, has been in practically constant operation ever since and has made a record in some respects very remarkable. It was built with twenty stamps, and in the following year increased to thirty stamps. During these seven years only four stems all told have been broken and one renewed, and the stems are not seriously worn in the guides. The stamps, when new, weigh 1040 pounds each, and make 102 drops per minute. Each stamp has therefore dropped about 450,000,000 times without renewal of stem or guide.

For this result I assign three causes: 1. The long stamp head and low guide prevent severe wrench to the stem when the stamp strikes hard at one edge of the shoe. 2. The solidity of the concrete foundations keeps the jar and vibration of the iron work at a minimum. 3. The iron guides give the stem but little play.

At the Hacienda de San Francisco, now running, the concrete was laid upon solid bedrock, and was 9 feet in depth and 9 feet in width. It was very thoroughly rammed as laid. On a hard bedrock there is no necessity for deep concrete, except to secure the required height—in fact, no foundation could be better than a solid, unfailing granite bedrock, with only a thin sheet of rubber or canvas between it and the mortar. With a mortar having a fairly thick bottom, this would make a perfect anvil for the blows of the stamps.

The top of the stamp head in the San Francisco is only 2 inches below the lower guide when the stamp has new shoe and die, and is raised 6 inches for drop. This, of course, requires that the housing shall be around the stamp head instead of around the stem, which is easily effected with a long stamp head.

Guides of iron themselves wear so little, and also wear the stem so much less than wooden guides, that they are beyond comparison better. For example, how thick would a stem be, after running seven years in wooden guides, without repairs or alteration in length? The reason that wooden guides wear the stem so much faster than iron ones is that they accumulate grit, whereas an iron guide becomes smooth and polished.

Sulphur.

The production of sulphur in the United States during 1901 was 7690 short tons, valued at \$223,430, which was derived from Nevada, Idaho, Utah and Louisiana, in the order of the importance of their output, according to the report of Dr. Joseph Struthers in "Mineral Resources of the United States, 1901," now in press, U. S. Geological Survey. A comparison with the production during 1900 of 3525 short tons, valued at \$88,100, shows an increase during 1901 of 4165 tons, or over 118%, in quantity, and of \$135,330, or over 152%, in value. It is worthy of note that Nevada and Oregon returned to the list of producing States during 1901. The production of sulphur in the United States during 1901 is the largest annual record ever made, and yet the domestic production has always been of insignificant proportions as compared with the total consumption of the country. The quantity of sulphur consumed in the United States from foreign and domestic sources in 1901, including the sulphur content of iron pyrite, which is used in the manufacture of sulphuric acid, amounted to 525,745 short tons.

The use of iron pyrite in the manufacture of sulphuric acid has shown a remarkable increase since 1891. The sulphur content of the iron pyrite used in that year was 93,233 long tons. In 1901 the sulphur content of the imported pyrite amounted to 181,668 long tons, and that from the domestic production of pyrite was 105,671 long tons, a total production of 287,339 long tons, or more than three times the quantity consumed in 1891. This use is increasing steadily. By far the greater part of the sulphur consumed in the United States is used in the manufacture of paper pulp by the sulphite process of treating wood pulp.

The imports of sulphur into the United States in

1901 was 175,210 long tons, valued at \$3,287,906, as compared with 167,696 long tons, valued at \$2,941,888, in 1900, and with 140,701 long tons, valued at \$2,523,203, in 1899. The estimated total domestic consumption of sulphur was 469,415 long tons in 1901, as compared with 408,038 long tons in 1900, with 345,904 tons in 1899, and with 211,491 tons in 1891.

Spot prices for Sicilian sulphur, per long ton, ex steamer at New York, ranged in 1901 from \$20.75 in April to \$23.25 in December.

The world's production of sulphur in 1900 was 577,420 metric tons, valued at \$10,698,494, as compared with 586,122 metric tons, valued at \$10,844,688 in 1899.

Pyrite.

The production of pyrite in 1901 was the largest yearly quantity yet recorded, amounting to 234,825 long tons, valued at \$1,024,449. A comparison with the production during 1900 of 204,615 long tons, valued at \$749,991, shows an increase in quantity of 30,210 long tons, or 14.8%, and in value of \$274,458, or 36.6%. The greater part of the output was derived from Virginia, Colorado, Massachusetts and New York, named in order of production. Ohio contributed 7585 long tons of pyrite, obtained as so-called "coal hases" from the coal mined in that State. No pyrite was reported in 1901 from North Carolina, which in 1900 produced 5000 long tons. No new mines of importance were opened during the year, although development work was carried on in localities which have long been known as probable producers, notably in New York, Virginia and North Carolina.

In addition to the large increase in the production of pyrite in the United States during 1901, there was a very large increase in the quantity of pyrite imported, the imports for 1901 being 403,706 long tons, valued at \$1,415,149, as compared with 322,484 long tons, valued at \$1,055,121, in 1900, an increase of over 24% in quantity and over 34% in value. The consumption of iron pyrite in the United States in 1901 was 638,531 long tons, as compared with 527,099 long tons in 1900, with 44,602 tons in 1899, and with 207,184 tons in 1891.

The quantity of sulphur displaced by pyrite for acid making is estimated at 287,339 long tons in 1901, 237,195 tons in 1900, 200,071 tons in 1899, and at 93,233 long tons in 1891, an increased displacement of over 200% in the eleven years from 1890 to 1901, inclusive. In addition to the development of the sulphite wood-pulp industry for paper manufacture, the increased production of phosphate rock in Florida and Tennessee and the corresponding increased domestic manufacture of sulphur phosphates has increased the demand for iron pyrite, since for the purpose of these manufactures the sulphuric acid made from iron pyrite answers as well as the purer acid made from sulphur. Notwithstanding the large increase in both the production and the imports of pyritic iron in 1901 the price of the domestic product advanced from \$3.67 per ton in 1900 to \$4.36 per ton in 1901, and the price of the imported pyrite advanced from \$3.27 per ton in 1900 to \$3.51 per ton in 1901.

According to the latest available figures, the world's production of pyrite in 1900 was 1,640,979 long tons, as compared with 1,552,039 tons in 1899, and with 1,082,808 tons in 1892. The corresponding displacement of sulphur was 738,440 long tons in 1900, 648,418 long tons in 1899 and 487,263 long tons in 1892.

Alaska-Treadwell Costs, Etc.

TO THE EDITOR:—I have read in several papers that there is a cut of 34 cents per ton in the cost of reduction of Alaska-Treadwell ore. What can you tell about it? We naturally look to the MINING AND SCIENTIFIC PRESS for such information first. Can you give some details in general as to what is being done on Douglas Island, Alaska—costs, treatment, etc.? E. E. S. Silverton, Colo., Aug. 1.

Considerable has been furnished our readers on this subject right along. On page 20 of the issue of July 12 appears some recent data. The item referred to by our Silverton correspondent was noted, but so far the statement is not verified. Judging by the monthly reports, no material reduction in costs has taken place in the Treadwell mine of late. The mills are, however, crushing 45% more ore than they were in 1899, when the cost was 78 cents per ton. It is believed that the present management is an improvement on the old. Everything is, as generally known, on a large scale. About 1,000,000 pounds dynamite were used last year.

In the month of June the 240-stamp mill ran 30½ days, the 300-stamp mill 30½ days; 89,654 tons ore were crushed; the estimated realizable value of the bullion was \$76,929; there were saved 1562 tons sulphurets, of an estimated realizable value of \$74,878, the working expenses of the month were \$65,355.

Figuring from that data, the total June yield was \$151,807, a profit of \$86,452; cost per ton of crushing, 73 cents; yield per ton, \$1.70; tons crushed per stamp per day, 5.4; profit per ton, 97 cents; sulphurets saved, 1.74%.

Reformed Copper Ores.

NUMBER II.

Written for the MINING AND SCIENTIFIC PRESS by J. C. GOODWIN.

I will not attempt to discover to you the origin of these ores nor will I endorse any of the theories by geologists or mineralogists. Some advocate the theory that the original deposits of ore were deposited from solutions deposited by lateral secretions; by others that it came from a great depth in an aqueous, alkaline, or acid solution, and were deposited as sulphide, or molted magma, etc. By studying and examining many ore bodies as I have found them in many formations, I am convinced that the kind of ore originally deposited depended to a great extent upon whether the rock in which it was deposited was an acidic rock, or basic. The kind of rock in which the ores were originally deposited not only gave character to the ore, but caused ores of various minerals to be deposited in the same vein. That is the character of the country rock, or the walls of the veins or deposits had great influence upon the original ores, and as the ores were breaking up or being decomposed by oxidation. The country rock causing the solutions that were formed to be alkaline or acidic, gave character to the new bodies of ore that were being redeposited. I shall attempt to prove my assertion by comparing the conditions of the original and reformed ores found in the many great mines.

In the Bisbee mine all the ores that were originally deposited on the contact or near the contact in the rhyolite were sulphide ore and all ores that were deposited higher up in the limestone were carbonates, except the great bodies of manganese. They were deposited as sulphides; the iron that was associated with the manganese was also deposited as a sulphide.

The reason for believing that the manganese and iron were deposited as sulphides is that the solution containing the iron and manganese as sulphides was an acid solution, but this solution on coming in contact with the calcium carbonate was not only neutralized, but was changed into an alkaline solution and from this alkaline solution the iron and manganese were deposited as sulphides. I have found on examining various deposits of manganese that they were associated in nearly every instance with calcium carbonate (unless hog manganese), if they carried silver, copper, etc.

Some of the silver mines of Tombstone contain great bodies of manganese in cavities in the limestone. There is associated with the manganese in these deposits silver and lead sulphides, and in one mine, the Lucky Cuss, under a granite tongue where it was best protected from the elements, was found manganese sulphides associated with the sulphides of iron and silver. I believe that this deposit of manganese as well as the deposits of manganese found in and about the Copper Queen mine, as well as other places, were originally deposited as sulphides. The reason that manganese is seldom found as sulphide is because it breaks up if acted on by air and moisture and forms other and more stable compounds, such as the oxides. In these large beds of manganese at Bisbee are found cavities in the form of geodes, the ores of these geodes being the beautiful ores of malachite and azurite.

I am indebted to Prof. W. P. Blake, Director of the School of Mines of Arizona, for the information in regard to the conditions under which the manganese sulphides ores are found in the Lucky Cuss mine at Tombstone.

The first great bodies of ore that were found in the Copper Queen were the oxides, and carbonates of copper. The Copper Queen Co., as well as other copper mining companies, were searching for carbonate and oxide ores. Little was known about the sulphides as an ore twenty years ago, and when encountered they were looked upon with disfavor, and this is one reason why the bodies of sulphides ores were not then explored. There is some contention among the mining men as to whether the carbonate and oxide deposits at Bisbee are deposits of fissure veins.

Prof. Arthur F. Wendt says of the carbonate and oxide deposits: "The ore beds mined in limestone traced upward are completely filled with calcite, a reason why the ore bodies are fissure veins and not ore beds."

I have found at Bisbee, on examination, that many fissure veins filled with calcite cut the limestone at right angles to the bedding of the limestone. By sinking on these fissure veins it has been found that some have led to ore deposits in limestone, while others have passed through the limestone, to the sulphides hundreds of feet below the surface. This proves that the vapors and hot water passing up through the various fissures dissolved out cavities in some of them, while in others it did not, and it also proves that the material which filled these cavities came from below, and that the great sulphide bodies of ore found on the contact between the felsite and limestone were being deposited, perhaps from a molted magma, at the same time. The deposits of the carbonates and oxides of copper now found high up in the limestone perhaps were mostly deposited as sulphides, but in the deposits of manganese ore all the original ore has been decomposed and reformed.

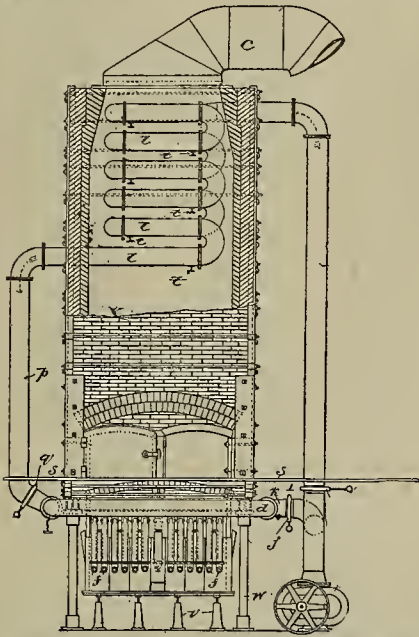
(TO BE CONTINUED.)

Mining and Metallurgical Patents.

Patents Issued July 29, 1902.

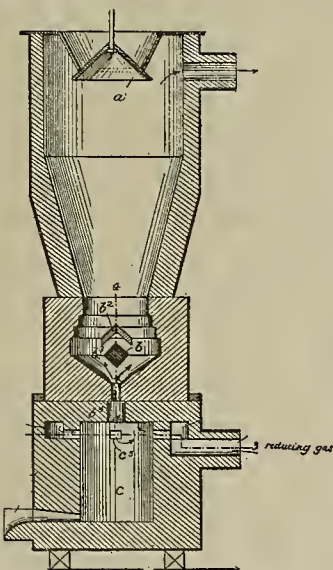
Specially Prepared for the MINING AND SCIENTIFIC PRESS.

HOT BLAST FURNACE.—No. 705,640; E. T. Bradford, Denver, Colo.



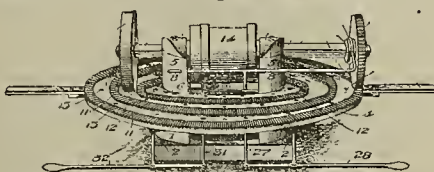
Hot blast furnace, provided with blast heating pipes located within furnace adapted to conduct blast from upper and cooler to lower and hotter portions of pipes, tuyeres connected to hotter end of heating pipes, blower mechanism for supplying air to cooler end of heating pipes, non-conducting refractory lining in portion of furnace surrounding heating pipes, portion of heating pipes within refractory lining consisting of series of horizontal pipe sections arranged in zigzag order, supported on transverse supports, series of substantially similar U sections provided with flanges, secured to horizontal sections at flanges.

REDUCTION OF METALS FROM THEIR ORES, ETC., IN ELECTRICALLY HEATED FURNACES.—No. 705,651; R. C. Contardo, Sevres, France.



Process herein described of obtaining metal direct from the ore consists in subjecting ore to high temperature solely by radiation and convection from voltaic arc, and simultaneously causing current of reducing gas containing carburizing agent to flow through the ore, whereby approximately exact amount of carbon desired may be combined with the iron.

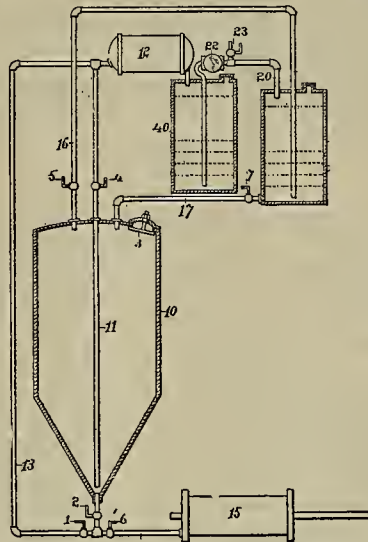
SWEEP OPERATED HOISTING WINDLASS.—No. 705,880; E. R. Storrs, Cripple Creek, Colo.



Combination with rotary power table having concentric gear tracks, of separated bearings located on opposite sides of center of rotation of power table, shaft journaled in bearings, winding drum secured on shaft intermediate bearings, guide wheel loosely journaled on one end of shaft, adapted to bear against

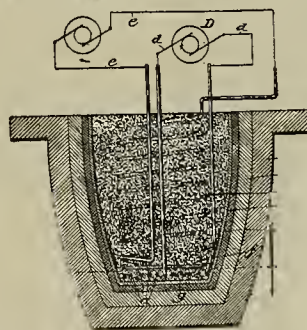
table between gear tracks and pinion slidable longitudinally on shaft, adapted to turn therewith, which is arranged to mesh with any of gear tracks.

CYANIDE PROCESS OF WORKING GOLD, SILVER OR OTHER ORES.—No. 705,698; R. H. Officer, J. W. Neill, J. H. Burfeind, F. H. Officer, Salt Lake City, Utah.



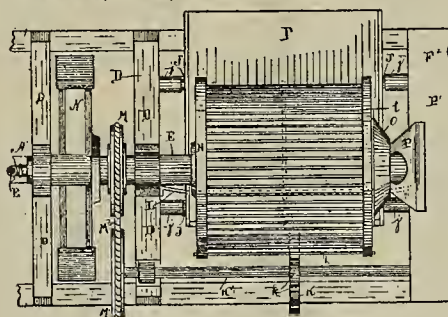
Improvement in cyanide process of recovering precious metals from ores, slimes, tailings or concentrates, consisting in treating ore, slime, tailings or concentrates with suitable cyanogen compound passing hydrocyanic-acid gas set free by such treatment through regenerating caustic solution, then filtering and washing to recover metals precipitated by acidification, using gas after passing through regenerating solution to agitate fresh quantity of pulp.

METHODS OF TREATING METALLIC OXIDES IN THE PRODUCTION OF METALS AND ALLOYS.—No. 705,727; F. C. Weber, Chicago, Ill.



Placing the to-be-treated charge, comprising aluminum in admixture with metallic oxide reducible by aluminum, in crucible, subjecting same therein to drying and preparatory treatment by electric heat at time reaction is to be undergone, for preparatory treatment to eliminate moisture, break up molecules containing water of crystallization and drive off water of crystallization and bring charge into condition for reaction, then raising temperature to degree sufficient to effect reaction and adding to intensity of reaction temperature, temperature of preparatory heating, thereby increasing effective heat by added caloric of preparatory treatment.

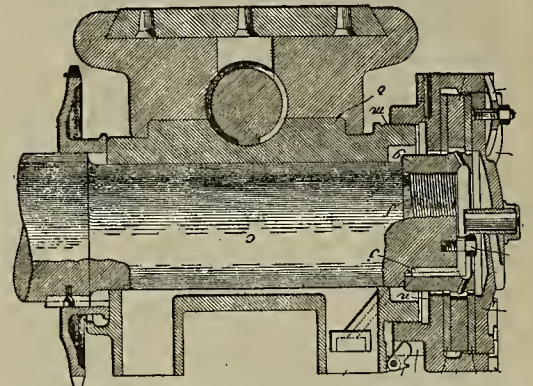
CRUSHING AND PULVERIZING MILL.—No. 705,870; J. F. Sanders, Boise, Idaho.



Combination of rotatable cylinder or drum, longitudinal bars set apart to leave spaces or interstices between them and forming body of cylinder or drum, supporting heads one at each end of cylinder or drum receiving and retaining ends of bars, rotatable tubular shaft on which cylinder is mounted, holes or perforations in shaft within cylinder, water supply pipe entered into one end of shaft, discharging water therewith and escaping water through holes into interior of cylinder, openings in head of cylinder, funnel or hopper attached to head having openings revolving therewith, receiving therewith ore for depositing ore within interior of cylinder, means for crushing

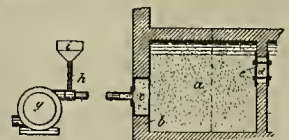
ore within cylinder, subject to action of discharged water from tubular shaft, an amalgamating plate located beneath cylinder, receiving thereon pulverized material discharged through spaces of cylinder, cam wheel engaging end of amalgamating plate, shaft on which cam wheel is mounted, power connection between shaft of cam wheel and tubular shaft for revolving cylinder and reciprocating amalgamating plate from common source of power.

CORNISH ROLL.—No. 705,749; A. J. Gates, Chicago, Ill., assignor to Allis Chalmers Co.



Combination of roll shaft, thrust collar provided with annular flange in threaded engagement with one end thereof, gib key engaging slot formed by and in threaded portions of roll shaft and thrust collar for holding such parts in desired position, ring nut surrounding thrust collar having one end in threaded engagement with frame of machine for adjustment thereof, plate nut in threaded engagement with other end of ring nut to complete closure for and confine thrust ring, means for holding plate nut in adjustable engagement with ring nut, means for holding ring nut in adjustable engagement with frame, wearing ring interposed between ring nut and annular flange of thrust collar, and wearing ring interposed between plate nut and annular flange of thrust collar.

PROCESS OF MAKING THE INTERIOR OF COKE OVENS OR OTHER KILNS TIGHT.—No. 705,681; R. Kuhn, Bruch, Germany.



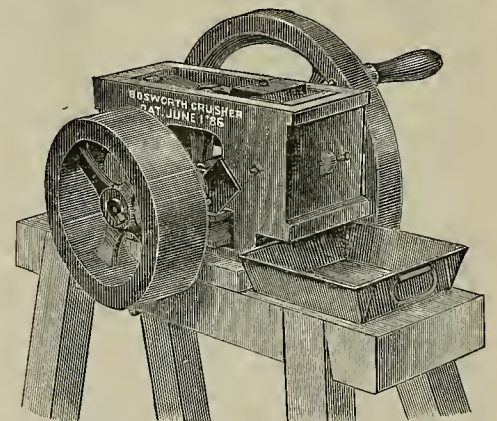
Process of making interior of coke ovens and other kilns tight, consists in mixing fine ore dust with fine ground ashes or other dusty material, then blowing mixture into hot chamber, walls or sides of which are intended to be tightened, effect being that dust will keep floating for a while, then settle by degrees in pores and cracks and thereby make walls perfectly tight.

TREATMENT OF STEEL INGOTS FOR FORGING.—No. 705,330; C. T. Dudley, Golden, Colo.

Process of treating cast-steel ingots and the like previous to forging, which consists in cooling cast ingot to temperature below 550° C., reheating cooled ingot to temperature between 750° C. and 850° C., maintaining reheating temperature for period of from thirty to forty-five hours, finally heating ingot to forging temperature.

The Bosworth Crusher.

The Bosworth crusher, illustrated herewith, is a



crusher for laboratory use designed for either hand or power. Its capacity is fifty pounds per hour, the largest piece of ore so crushed not to exceed 1½x1½x2½ inches. There are fifteen parts to it, any one of which can be furnished by its makers, the Denver Fire Clay Co., 1742 Champa street, Denver, Colo.

Mining Summary.

Specially compiled and reported for the
MINING AND SCIENTIFIC PRESS.

ALASKA.

On Resurrection creek, near Hope, the R. C. A. M. Co., operating the property, has laid 4100 feet hydraulic pipe, installed an Evans hydraulic elevator, constructed a wingdam so that work could proceed in the original bed of the creek. Sinking with the elevator began June 28, bedrock to be reached in 25 feet. The creek has been worked by miners for a long time with pick and shovel and sluice-boxes, but owing to the immense amount of seepage water it was impossible for the miners to sink and work over 7 feet from the surface, the top gravel yield averaging \$2 per yard. The creek is 25 miles long and presents this condition: 8 or 10 feet of loose top gravel; under this and acting as a sort of bedrock is found clay, ground up or pulverized slate, rimrock and quartz, deposited by glacial action; this in thickness from 2 to 8 feet. Beneath this glacial clay or so-called bedrock is another layer of gravel, through which to bedrock of the creek is estimated to be 10 to 20 feet. In a few instances miners have been able, in the winter time, to penetrate through the upper gravel and the glacial clay to the lower strata of gravel, but have been able to penetrate it only a foot or so. This lower gravel has been found to be a compact gravel, darker in color than the upper, with much iron rust indications, and very rich.

The steamer Humboldt, arrived from Skaguay and Alaska, brings \$500,000 Alaska gold dust. The steamer St. Paul, nine days from Nome Aug. 6th, brings \$410,000 gold.

ARIZONA.

COCHISE COUNTY.

Work has begun on the Tombstone branch of the El Paso & Southwestern Railroad.

The Hidden Treasure, a south extension of the Monte Cristo, has been bonded by the Monte Cristo Co. for \$40,000.

The Los Angeles creditors of the Copper Belle M. Co., which is working some properties at Gleason, have petitioned the United States Court at Tucson asking that the company be declared bankrupt. The Copper Belle M. Co. is a West Virginia corporation which purchased some copper prospects from the founder at Gleason, and has been working them extensively. There are already three attachments on their properties, one of them being for \$6000 attorneys' fees claimed by Judge Reilly of Tombstone. The secured and unsecured debts of the company will aggregate \$100,000. W. J. Kirkpatrick of Tucson is representing the Los Angeles creditors.

Near Bisbee, the machinery for the new hoisting plant of the Modern Copper Co. is being put in position.

GILA COUNTY.

The Era hears that the Gila Valley, Globe & Northern Railway will make a reduction of one-third in its freight rate shortly, so as to satisfy the mining companies around Globe. The Old Dominion Co. has paid in excess of \$300,000 per annum in freight rates, which fact has had much to do with the high cost of the Old Dominion copper. The reduction of rates will permit the Old Dominion to work lower grade ores.

N. S. Berry, superintendent United Globe mines, Globe district, says the company employs forty men, and steady work is being prosecuted. The company has shipped considerable ore to Bisbee for reduction. The property is owned by the Phelps Dodge Co.

C. M. Clark, interested in an electrical enterprise near Globe, says the site of the water power plant by which electricity is to be developed is on Salt river, directly north of the town of Globe, 2 miles above the Tonto reservoir. Water will be diverted from the site by a 1½-mile tunnel, and conducted by alternate tunnels and flumes for 6 miles down the river, gaining a head of 289 feet. Power in Globe and the camps roundabout costs now \$300 a year. Electric power will be furnished at \$150 a year. It will take eighteen months to complete the plant after the work has actually begun. It will take almost a year to get the machinery on the ground after it has been ordered.

GRAHAM COUNTY.

The Antetam mine, near Metcalf, is being developed by P. F. Crowley. Ore is being sacked at the mine to be shipped to the A. C. Co. of Clifton for treatment. The Troy smelter at Troy has been temporarily shut down on account of a strike of the hoisting men. The men were getting \$4.50 per day and demanded \$4.50 for eight hours' work. The com-

pany refused, closed the smelter and stopped work on the Alice mine. The company has a carload of copper 97 fine ready for shipment.

So much water was struck in sinking the main shaft on the Stevens group of claims, near Metcalf, that a pumping plant must be put in.

MOHAVE COUNTY.

At Chloride, the new smelter starts August 15th.

The concentrating plant at the Tennessee mine is running on full time.

The Philadelphia & Arizona M. Co., which owns the Connor-Minnosota, Merimac and undeveloped claims, begins opening up next month.

The strike in the Minnesota-Connor mine, near Kingman, is still showing up. A hundred tons of the ore will be tried out at the smelter to ascertain the feasibility of smelting in connection with the concentration plant. If the concentrates have to be handled they will be briquetted.

PIMA COUNTY.

The sale of the Indiana Sonora group of mines has been declared off, says the Tucson Citizen. Had the deal gone through it would have been the largest consummated either in Mexico or Arizona this year. It was reported that the Phelps-Dodge people had purchased the property. The price paid was said to be something over \$1,000,000. The deal was fixed up in New York, and a number of Indianapolis people were named as the owners. It now appears that the Indianapolis people merely had a bond on the property. L. Lindsay is the real owner of the mines. About six months ago he bonded the group to the Indianapolis parties, and now it seems that this bond expired about five days after the so-called sale to the Phelps Dodge Co. The provisions of the bond were not lived up to by the holders of it, and consequently the mine reverted to the original owner. The provisions of the sale call for monthly payments, but they do not cover those of the bond.

SANTA CRUZ COUNTY.

The Buena Vista M. Co., whose copper mines are in the Patagonia mountains, 12 miles from Nogales, will erect a smelter, concentrating and converting plant on the Santa Cruz river near the Southern Pacific railroad. Either a railroad or aerial tramway will be built from the mine to the plant, distance 4 miles, under the management of F. N. Cox.

Last week, says the Oasis, the first carload of gold ore ever shipped from Nogales went forward to El Paso from the Uncle Sam mine, 5 miles from Nogales.

YAVAPAI COUNTY.

Jerome reports the fire on the first, second and third levels of the United Verde mine partially under control, though the mine will have to be closed down and bulkheads put in. So far there has been but one death from the fire, a miner who had gone down to rescue others who were caged by the flames. After saving the lives of the men the rescuer was overcome and died. The loss to the workmen by the shutdown will be heavy.

The Senate Gold Co., whose property adjoins the Congress mine, has ordered a 54 H. P. Fairbanks & Morse gasoline engine and will install an air compressor and three Sullivan drills. A pump with capacity of 125,000 gallons a day will also be put in. The property was bought by the Senate Gold Co. from Carrigan & Morgan, employees of the Congress Mines Co., last March.

The Verde Queen Copper Co., at Jerome propose to sink 5000 feet and at that depth drift 1000 feet.

Near Prescott, Superintendent Jones of the Braganza G. M. Co. has fifty-five men at work on the Henrietta.

It is reported that the Gold Basis group, on Groom creek, near the Monte Cristo, 7 miles from Prescott, is sold for \$65,000, and that the purchasers will sink 500 feet.

The United Verde copper mine produced 41,970,210 pounds of copper in 1901. Manager Felt of the Model G. M. Co. is putting in a 10-stamp mill, steam boiler, etc., near Kirkland.

Manager Baumann of the Baumann C. Co. will concentrate present development work upon the Swiss Girl mine.

The Oriental M. Co., in Big Bug, is putting in a forty-ton mill on the Tough Nut claim.

The Victor M. Co., Lynx creek, is operating its new mill.

The Empire on Groom creek has resumed work.

The Chicago Co., whose mill is in the hands of the Hassayampa, will put in a fifty-ton electrolytic cyanide process plant in connection with the mill.

CALIFORNIA.

AMADOR COUNTY.

The Jackson Ledger reports that at the Amador Phoenix an extension of the bond on the property for six months has been

secured.—The Sargent shaft is following the ledge, and in soft slate and gouge.

—At the Argonaut no effort is being made to keep the mine free of water. When the shaft work is finished it is expected that all work will cease pending the decision by the United States Supreme Court of the Argonaut-Kennedy suit.—The Onelda's cleanup left a balance of nearly \$5000 after deducting running expenses. Forty stamps are running.

At the Gwin mine the new hoist will be run by water, as is the present one. The shaft is 1840 feet in depth. Sinking will probably be resumed. The 80-stamp mill is running.

At the Lincoln mine Supt. Voorheis is pushing the west crosscut on the 2000 level.

On the Mocking Bird ranch a quartz claim is reported sold by O. Jones to Seattle, Wash., men for \$5000—\$300 down, remainder in installments.

J. A. McIntire has bonded the old North Star claim, between Sutter Creek and Amador City, for \$15,000.

A telephone system has been established throughout the Gwin mine.

The Jackson Herald says the Rhetta M. Co. has now paid about \$7800 on the purchase price of \$20,000 for the Bay State mine. W. W. Worthing expects to start the mine Sept. 1.

CALAVERAS COUNTY.

Near Angels the Crystal mine is to be reopened and shaft retimbered. An engine, boiler and hoist capable of sinking 1000 feet will be put on. W. Morehead, formerly of the App, is in charge.

The rich rock found in the Oriole continues to grow in value.

In cutting a station at the 1300 level in the Ghost mine a rich vein has been struck.

The Sultana shaft is down 600 feet, at which point rock has been found running \$10 free gold.

The Altaville mine is shut down, preparatory to putting in an air compressor and a larger hoist.

Sinking progresses at the Last Chance mine.

EL DORADO COUNTY.

In the Eureka slate quarry, near Kelsey, 3 miles north of Placerville, the slate is in a vein about 100 feet wide, standing almost vertically on edge. From a pit 41 feet deep at the base of the cliff slate is taken up to the splitting sheds. The slate is quarried in benches of 8 feet; the rough blocks are sent to the blockmaker, who grades and reduces them to sizes. The splitter reduces them by means of long, thin chisels to sheets about an eighth of an inch thick; they are then trimmed to a rectangular form, the object being to get the biggest slate possible out of each irregular piece. Great waste is caused by blasting, which is necessary until the quarry can be enlarged sufficiently to enable a channelling machine to be used, which will cut out blocks without shattering them. To provide for this enlargement, two tunnels are now being driven on the north end of the quarry. The quarry produces 500 squares per month, divided into sixteen different sizes, ranging from 12x24s to 6x12s. The slate is rated at about \$7 per square at Placerville and sells readily. A trench has just been dug to contain 6800 feet of pipe, from 18 inches down to 11 inches in diameter, for water from the Delmatia reservoir, where a new air compressor is to be built. The pressure will be 550 feet; 100 H. P. will be developed.

C. Edner says the Omo mill is crushing ore. Supt. Smart is operating his hydraulic mine. At Becher's Crossing twelve men are employed.

FRESNO COUNTY.

(Special Correspondence).—G. E. Shores of the Esperanza Oil & Gas Co. says they have struck a 200-barrel well of 20 gravity oil at 975 feet on section 6, township 19, range 14, near here. There is 900 feet of oil in the pipe and the well, which is in the third sand, has a periodical flow. A 2000-barrel tank is to be put up and another well sunk, probably 300 feet to the south.

Coalinga, Aug. 4.

KERN COUNTY.

The Randsburg Miner reports the July clean-up of the Butte \$5725, product of ninety-one tons of ore, \$63 per ton.

Bakersfield reports that the California Power Co. has sold its \$3,000,000 of bonds in Chicago. Work can soon begin on the proposed plant in Kern river canyon.

The Santa Fe Railroad Co. has bought the oil wells and land of A. B. Butler and others at a sum reported all the way from \$1,000,000 to \$2,300,000. Butler had a five-year contract with the Santa Fe Railway to furnish that corporation with a large quantity of oil annually at 75 cents per barrel. At the time this contract was made oil was worth considerably more. Since then oil has declined; at one time the price at the wells was 15 cents per barrel. The Santa Fe Co. found it ex-

pedient to buy the property of Butler and associates.

KINGS COUNTY.

(Special Correspondence).—Francis & Dawson, prospecting on the Avenal ranch, 45 miles southwest of here, have found cinnabar rock that goes 6%, and have shipped several flasks to Los Angeles. They will put in machinery, including a 12-foot retort.

Lemoore, Aug. 5.

LOS ANGELES COUNTY.

The Mining Review says that the West Coast Fuel & Iron Co., owning 740 acres in Los Angeles and Kern counties, has taken out iron ore and has produced the first commercial pig iron ever produced in southern California, being the first to secure results from smelting with crude oil. The demand for commercial pig iron in Los Angeles is upwards of 600 tons per month. The price quoted last week was \$29 50 in the local market, while Pittsburgh prices range from \$21 to \$22 per ton. The cost of the crude oil used is calculated on the basis of \$4 coke; at this cost there is a profit in the freight rates alone.

MARIPOSA COUNTY.

From sixty tons of rock from the Jacob Teats mine, at Whitlock, recently milled at the Ellingham mill, 114 ounces of gold was secured.

In a recent fire that swept the North Fork country the 5-stamp mill and office of the Banderita mine were entirely destroyed.

N. C. Ray of Coulterville has started the survey for the proposed electric plant to be established on the Merced river to supply power for the mines of northern Mariposa.

The Chronicle says that the Penon Blanco mines, 2 miles from Coulterville, have been bonded to a French company. They belong to Captain A. H. Ward.

MONO COUNTY.

The Crystal Lake M. Co., at Lundy, is working about 100 men, running fifteen stamps in the mill and putting in a new mortar, preparatory to adding five stamps more. The lower tunnel is in about 1850 feet and progressing at the rate of about 43 feet per week.

NEVADA COUNTY.

The Union reports a clean-up from the fourteen days' run at the Sierra Queen mine, near Nevada City. It is understood that within a short time the present working force will be increased.

About the 20th inst. the Pennsylvania mine will resume. The underground workings have been idle since July, 1901. The works are free of water and the men can begin where operations were suspended. Surveyors have begun to get data for a report on the underground workings before the commission to decide upon the question of damages between the Pennsylvania and the W. Y. O. D. The former sued to recover \$600,000.

This week the W. Y. O. D. suspended operations, laying off fifty-three men, who have been employed since the litigation with the Pennsylvania began. The tributers have been told to hurry their work along as speedily as possible and clean up all their rock, as no more work would be done there until some future date.

Near Grass Valley J. E. Carter expects to be soon able to resume at the South Idaho.

Near Nevada City Supt. Turner has unwatered the Coe mine and is sinking and drifting on the 800-foot level.

The machinery on the Hartery mine, at Allison Ranch, is to be removed to the Nugget mine, owned by H. B. Nichols.

The acquisition of the Red Cross property, near Omega, by a new company, was noted in the issue of July 26. The Red Cross M. Co. this week filed articles of incorporation, to "engage in the purchase of mining and mineral lands and the treatment of all mineral-bearing ores and to develop and work mining properties." Incorporators: J. A. Brent, San Francisco; W. F. Snyder, C. I. Rader, C. O. Ellingwood, B. Snyder, Salt Lake City, Utah; P. L. Kimberly, Sharon, Pa.

Near Spenceville, Superintendent Bitner of the California G. & C. M. Co. is doing considerable exploration work on its ground. An assay gives gold \$7, copper \$20 per ton. The company proposes erecting a smelter.

A new pipe at the New Independence mine gives ample power to run the mill at its full capacity and additional power for hoisting.

The North Bloomfield Co. will make extensive repairs to its ditches and flumes, and has ordered 3,000,000 feet lumber.

PLACER COUNTY.

At the Crosby M. & M. Co.'s property, near Lincoln, Supt. J. B. De Golyer will have mine machinery on the ground by Sept. 1, when work will begin.

J. B. Patterson is locally credited with intention to resume work in the Patterson mine, 2 miles north of Penryn—160 acres.

The mine has been opened by a 1000-foot tunnel and is in and under gravel.

FLUMAS COUNTY.

H. L. Coffin, secretary Canton P. M. Co., north fork of Feather river, is having work done on the property.

Nelson Point reports discovery of stones on Nelson creek which are locally pronounced to be genuine diamonds.

A. B. White, Supt. Quincy M. & W. Co., is engaged in the season's cleanup.

RIVERSIDE COUNTY.

C. H. Gray, from Arica Mountain district, has \$2000 bullion, taken from sixty tons of ore from the Arica group of mines, 60 miles south of Danby.

SACRAMENTO COUNTY.

The Sand Pile mill, near Folsom, is putting in two cyanide tanks.

SAN BERNARDINO COUNTY.

The mines of Vanderbilt district, which have lain idle for several years, are again to be worked. With the extension of the California Eastern Railroad the camp is now reported enjoying a revival of old times.

The St. George and Boomerang mines at Vanderbilt, belonging to the A. G. Campbell estate, have been sold to Eastern men. The pumps are raising the water from the lower levels and preparations are being made to work the properties. Green Campbell is in charge.

The Gold Bronze mine will shortly resume work, after many years of idleness.

SHASTA COUNTY.

The McCloud River Electrical Power Co. has given a contract to the San Francisco Construction Co. and G. W. Elder to construct a concrete and masonry dam on the McCloud river, 20 miles from Baird Station, the dam to be 100 feet high, 500 feet long, constructed of concrete, masonry and rock filling.

The Redding Free Press says the Tarbet Mining Syndicate of Salt Lake City, which bonded the Afterthought copper and gold mine, near Furnaceville, now owns the mine, having paid about \$100,000. The Tarbets are locally believed to only await the building of a railroad to put up a smelter and add a copper and gold producer to the list.

The Heintz G. D. Co. launched the boat for the dredger near Horsetown this week. The barge is 100 feet long, 36 feet wide. The dredger will run day and night, with a capacity of 4000 cubic yards per twenty-four hours. Diggers fastened to moving chains break up the gravel, which is then lifted by centrifugal pumps. The power will be supplied by the Northern California Power Co.

Work will soon begin on the new power plant that is to be put up near Whitmore by the Northern California Power Co.

Panter & Litsch, who have been tunneling at a cost of several thousand dollars in the Evening Star mine, at Old Diggings, have a ledge 3 feet wide.

The Searchlight says that more than 350 men are now at work in and about the Iron Mountain mine, Keswick, and every man who applies is given employment. The mine payroll has contained in the neighborhood of 600 names on more than one occasion in the past, but a large number of these were hammer men. Machine drills have taken their places. The present force, with the aid of machines, is as efficient in productive capacity as the larger force of three years ago. The workings are cool and the extraction of ore is proceeding on nearly all of the levels. Men are doing development work on the Hidden Treasure mine, also owned by the Mountain Copper Co.

At the Hornet and other claims on the north side of the mountain, diamond drills are in use. Ore is coming down from the mine faster than the smelter consumes it, and reserve supplies are in storage at Keswick. There are still large supplies of calcined ore on hand in Keswick—8000 tons at the Sacramento and 13,000 tons at the Race Track.

At Keswick and Iron Mountain ore trains are running, ore bodies struck, smelters starting up again and several new smelters to be installed. Tunnel drafts have been walled up by masonry and dumpage dumped in the chute over the fire. Water has been allowed to soak in above the burning portion where the smoke used to issue, and no smoke is coming out now. After the winter torrents had flooded the mine, the fire broke out again, but this method of smothering the fire with smoke will be successful.

G. A. Von Krusze will put extensive improvements on his Sybil mine near French Gulch—a steam hoist, air compressor and air drills. A consignment of 625 sacks—two carloads ore—lies in Redding awaiting shipment to the smelter.

SIERRA COUNTY.

Supt. Buckley expects to reopen the Empire mine at Gold Valley and sink the shaft, already down 400 feet, to the 1000-foot level.

SISKIYOU COUNTY.

M. M. Hough has sold to R. Phillips, Scott River, for \$100,000, in installments, the Quartz Hill, Ryan and California mines, ditches, giants, pipes and other apparatus. This property will be worked on an extensive scale as soon as arrangements are completed.

The dredger at Hawkinsville has been fitted up with electric lights so as to put on night shifts.

The Blue Gravel mine, near Yreka, is to be reopened by a local corporation.

TRINITY COUNTY.

The California Mother Lode Mines Co. have three claims near the Midas mine. The ore is free milling. The lead has been crosscut in two places, showing a vein about 30 feet wide, an average value of about \$7 per ton.

In the Schroeder quartz mine at Deadwood active operations are to be carried on steadily.

TUOLUMNE COUNTY.

The Hidden Treasure Blue Gravel claim on Table mountain at Mormon creek is being worked by C. L. Lang and Duchow Bros. Upraises have been run and the eastern rim of the old river bed channel encountered. The slate bedrock is hard as adamant. Drifting is in progress along the bedrock to crosscut the channel. Another upraise is being run to tap the channel at its lowest point.

At the Shawmut 100 stamps are in operation; the cyanide and chlorination plants are working to full capacity.

Forty additional stamps go in the Shawmut mill.

The Sonora Democrat reports that the shaft in the Soulsby mine is nearing the 300-foot mark.—A contract has been let to sink a shaft on the Sullivan mine. Hoisting works are being erected and an air compressor will be put in.—The O'Hara mine, north of Sonora, has yielded \$3000 gold during the past week.—At the Republican mine a contract to sink the main shaft to the 600-foot level has been let.

COLORADO.

The Colorado World's Fair Commission has a space 300x700 feet close to the Mines and Metallurgy building on the St. Louis World's Fair grounds, which was illustrated and described in the issue of June 7, 1902, which will be used solely for the outdoor exhibition of operative mining machinery. This is designed to afford the manufacturers and inventors of quartz mills, concentrators, electric, compressed air and machine drills, stamp mills and all processes of reduction of ores in Colorado an opportunity to make exhibit. To further the success of this project, G. W. Thatcher, commander-in-chief of the St. Louis World's Fair Board for the State of Colorado, wishes to communicate with all the manufacturers of mining machinery in the State.

BOULDER COUNTY.

(Special Correspondence).—Cotton, Harris & Brown are taking out ore on the Forest mine which nets them \$7 per ton, and are doing a great deal of work on the property.

Wall Street, Aug. 1.

CHAFFEE COUNTY.

The Twin City M. Co. has bought the Vivandiere mine, near Turret, and working more men than ever before, have opened a 12-foot vein in the south crosscut, stopping ore that will run \$60 per ton.

Near the Darling claim Chinn & Roller, Salida, have been working three adjoining claims 3 miles from Garfield, at an altitude of 13,000 feet, a body of lead, silver and gold being uncovered. The vein is 12 feet wide, between a hanging wall of porphyry and foot wall of granite. There are 18 inches of carbonate ore next to the porphyry, 8 feet of quartz and 2½ feet of lead ore, the latter 40%.

CLEAR CREEK COUNTY.

Silver Plume reports a strike in the Seven-Thirty mine 3000 feet from the entrance to the tunnel and 1700 feet under the main workings. Four inches of ore has been opened up, which runs high in gold and carries 500 ounces in silver. Supt. Robison says that mine is one of the few silver propositions which withstood the panic of 1893 and its production has been maintained continuously.

Georgetown reports rich ore in the Cope & Barker lease on the Sunburst—gray copper, black sulphurets and polybasite.—The Alitude is producing high-grade ore.—Manager Wilcox will put in a gasoline engine and blower on the Tobin level of the Independence.—Work has been resumed on the Kirtley mine, Leavenworth mountain.

Near Idaho Springs, the Brighton mine, west of the Freeland Extension, which has been idle three years, is to be started up, a new shafthouse, 58x30 feet, built, and a steam hoisting plant put on. D. Ellis will be in charge.

The New Era Co., under the manage-

ment of J. R. Elgan, has started sinking the Great Eastern shaft, now 160 feet deep. The company owns its own mill—the only one left at Freeland. A Leyner compressor with a 4-drill capacity and water Leyner drills will be used in sinking and drifting.

The New Era tunnel is to be driven ahead to reach a number of leads, some of which show large, strong veins on the surface. It is understood that the company now has ample money in the treasury to do all dead work contemplated and then be in position to take out ore enough to keep their mill steadily employed—two shifts on their own ores. J. F. O'Neal is the foreman, and all the men that can be used advantageously will be put to work as soon as some little timbering is done.

The Woodbury M. & M. Co. owns sixteen lodes on Breckenridge mountain and has ore opened up for 240 feet in its tunnel. The ore streak gives a value of \$19.75. The company is having plans prepared for a mill, capacity fifty tons daily, to be run wholly on its own ores. R. S. Grier of Empire is superintendent.

GILPIN COUNTY.

(Special Correspondence).—The Mann vein, near here, which was discovered in 1860 by Dr. Mann, is one of the oldest patents in Gilpin county and is now being worked by the Ann Rutledge G. M. Co., A. B. Sanford, manager. In the early days the property was worked in a small way, but over \$100,000 was taken out in gold ore. The property passed into the hands of D. F. Pease, who erected a large shaft house and was getting ready to do business, but destroyed the shaft house and also the timbers in the shaft, causing the shaft to cave in. Work was abandoned for about thirty years. The property came into the possession of the Ann Rutledge G. M. Co. about two years ago, and they have been doing a great deal of work ever since. They now have a large shaft house, gasoline hoist capable of hoisting 600 feet. Nothing but development work has been done the past two years; they are just beginning to take out some good ore which they are shipping to the smelters and some to the mills. They intend erecting a large boarding house.

Central City, Aug. 3.

During the fourth week in July the shipments of smelting and crude ores, tailings and concentrates from the local depot to the Golden and Denver smelters, and to Idaho Springs, were ninety-six cars, 1920 tons. The total for July comprised 409 cars, 8180 tons, which as compared to the same month in 1901, shows a gain of ninety-one cars, 2450 tons, over 40%.

The Boston & Denver Con. M. & M. Co., Black Hawk, has sixty stamps crushing from 125 to 150 tons every twenty-four hours. The ores are hoisted from the Gregory incline. O. B. Thompson is manager.

H. Bolthoff of Denver is going to start another tunnel from the North Clear creek to cut the H. B. lode, opened up on the side of Nagle hill. By driving this tunnel 200 feet it will cut the lode at a depth of 275 feet.

GRAND COUNTY.

At a depth of 375 feet a flow of artesian water of 8000 barrels per hour has been struck, 8 miles north of Kremmling. It is the only artesian well in the State with such a flow. The well was being sunk for oil. Besides the flow of water, gas is also rising in great quantities.

GUNNISON COUNTY.

In Taylor Park the Taylor Park M. Co. report a vein 35 feet across uncovered averaging \$8 in gold. The ore is free milling and is found in porphyry between granite and quartz.

At Pitkin E. P. Ellsworth has bought the Golden Islet group of R. Heffner. The latter will still be a stockholder in the company. The agreement calls for \$40,000, part going to the original owner, the remainder to be expended in extensive development work.

HINSDALE COUNTY.

(Special Correspondence).—D. A. Farrell, manager the Red Rover M. Co., is pushing the work to completion on his new power plant and mill. Mr. Farrell gave me the following information regarding his property: For his power plant he has a building 26x46 feet, 14 feet high; a 24-inch pipe line, made of Oregon fir and iron bonds, 3750 feet in length; 5-foot De Remer water wheel; 180 K. W. generator; 1½ miles of electric line to the mill and mine. He has 400 feet head of water and can generate 800 H. P.

The bunkhouse is 90x20 feet and will accommodate about 100 men; has fine bath, wash and reading rooms for the use of the men.

The mill is 82x76 feet. The highest portion will be four stories. A machine shop will be operated in connection with the mill. The mill will contain one set of crushers, two sets of rolls, one single and two double Hartz jigs, three Wilfley

tables, 40x40-foot canvas tables for slimes, one 80 H. P. boiler, one 125 H. P. engine, three dyamos, 150 sixteen candle power lights. The mill will have a storage capacity for crude ores of 100 tons and the same capacity for concentrates. The daily crushing capacity of the mill will be 100 tons, table capacity 50 tons. The ore will be transported from the mine to the mill by a gravity tramway 654 feet in length. The concentrates will be loaded into wagons without handling by this system. Nearly everything about the mill will be done by gravity.

There is about 1½ mile of underground workings in the mine. The crosscut tunnel is 1175 feet in length, drift on the vein 575 feet, upraise connecting with the surface 600 feet. There are seven levels run from the upraise. Doing development work at present employs about thirty-five men on the mill and in the mine. About \$60,000 worth of ore has been stoped out in the upper level. There is ore now in every level of the mine, which averages about \$65 per ton. There is also ore that runs \$700 per ton, which is shipped crude. The lower grade ore is concentrated. The ore is gray copper, gold, silver and lead, the pay streak being 7 feet wide. The main tunnel is over 1000 feet in length, without a curve, the track in the same being perfectly straight. The mine will be lighted by electricity.

Lake City, Aug. 1.

LAKE COUNTY.

The assayers and mining men of Leadville are naturally wroth over the promulgation of a new rule by the American S. & R. Co., in effect that as between the company and the assayers all umpire work must hereafter go to Denver, and "splits" are done away with. The Herald-Democrat, in explaining the reasons for its adoption, says that one of the major difficulties connected with the business of mining is the determination of the exact metal contents of the ore shipped to the smelters. It is almost impossible to obtain two assays even from the same pulp which will exactly check, and controversies frequently arise which, according to long established custom, have been settled by compromise or umpiring. To illustrate: After the miner and the smelter have made their assays of samples, obtained from the regular system of sampling, a comparison is made and in ninety-nine cases out of a hundred there will be a slight difference. In many cases, the mine assays are slightly above those of the smelter. This fact, as explained by assayers, is not due to any intentional effort to actually change the result as shown by the scales, but to a system of reading the scales in many cases whereby minute fractional parts are either done away with or counted. Yet both are right, according to the system used. The mine assayer takes the higher readings, the smelter assayer the lower. And, in addition, there is always the natural element of disagreement which is bound to creep in where the delicacy of the operation is taken into consideration. Formerly "repeats" were allowed. By this method the miner and smelter sometimes came closer together. If not, then the pulp went to an umpire; in other words, to a reputable assayer, satisfactory to both parties. The trust abandoned the "repeats" some time ago. Under the new rule, "splits" also go to the wall. The miner settles for his ore on the basis of the smelter assay, or he can have recourse to an umpire, but the umpire in all cases must be a Denver assayer and the work must be done here. Leadville assayers are barred on the ground that they are too high. On the other hand, it is asserted that the Denver assayers are too low. The mine operators interviewed say: "It simply means that we must settle on the smelter assay. We have no other recourse. So far as the mine is concerned, there is really no reason under the new rules to assay the control at all. The assays on bucket samples would probably give us what information we desired as to how the ore was running, but the smelter assay must be accepted as the basis of settlement. While arbitration or umpiring remains, the smelter virtually names the umpires."

The whole thing shows what a "benevolent monopoly" will do when it has a chance. The thing is flagrantly one-sided. It will be interesting to see what Eastern mining publications "retained for the defense" will have to say, unless it be a case of addition, division and silence.

The Leadville output for July was 80,000 tons, of which 10,000 was zinc ore. It is estimated that the average gross value of the ore is \$14 per ton.

MINERAL COUNTY.

Creede reports are to the effect that the Amethyst mine will probably close down on the last of the month, because the ore is too good a milling proposition to ship crude at present railroad rates and smelter charges, when it can be concentrated from five or six tons into one,

and that a concentrating plant is to be put in.

OURAY COUNTY.

(Special Correspondence).—The Camp Bird veins are a milling proposition. The veins vary in width from 3 to 20 feet, a probable average of 7 or 8 feet. The gangue is principally quartz, in some places being very soft, but filled with gouge clay and talc, in some of the larger streaks considerable roselinite.

The Camp Bird mine is worked through three tunnels, the lower one being at an altitude of 11,300 feet. The lower tunnel is to crosscut through over 2000 feet in length andesitic breccia before striking the vein. Following the general plan in mining to stop overhand to work on broken ore in stopes, the present policy is to leave in the stopes fully as much ore as they send to the mill, so that the reserves are being added to in a ratio proportionate to the amount of ore milled (about 200 tons per day). The ore is sent down to the mill by a Bleichert aerial tramway, having a length of about 10,000 feet. The standing rope is made of interlocked wires and the transmission rope is a Trenton Iron Works 3-inch cable.

In the mill the ore undergoes the following treatment: First it is screened by grizzlies spaced 2 inches center to center. The coarse passes through crushers, 9x15 jaw opening. From the ore bins automatic feeders pass the ore to the stamps, of which there are sixty, each one weighing 550 pounds. The stamps run at 100 drops per minute, 6-inch drop, 4 inch discharge. The screens used are 26-mesh No. 29 wire, as these are found to give a more rapid discharge than the slot screens. After being crushed by the stamps the pulp passes over copper plates 16 feet long, then over a shaking quick trap, and then the plate tailings are passed to concentrators, being first classified in V boxes. This hydraulic classification of the plate tailings renders concentration on vanners or tables more satisfactory. They have thirty-five concentrating tables at present and talk of increasing the number. The tailings are passed into a hydraulic classifier, the coarse part sent to a Huntington mill, re-ground and reamalgamated and the tailings concentrated. The tailings from the stamp mill are run to the cyanide plant, where they undergo the usual percolation treatment. The cyanide plant is arranged for both single and double treatment, a single treatment occupying about thirteen days and the double treatment about nine days' time. The cyanide solution has a strength of four pounds to the ton of water. The slimes which escape settling in cyanide vats are run into a tank and there settled. These slimes are subsequently treated by the cyanide process in agitation vats. At present they are improving upon the slime treatment by the use of filter presses, and have retained E. B. Hack for these experiments. The mill is at an altitude of 9900 feet. When Mr. Hammond was here he had not decided on a permanent manager and appointed Harold A. Titcomb to act until a permanent man could be appointed.

Ouray, Aug. 1.

L. B. Jackson, president Imogene Gold Basin M. & M. Co., has returned from the East and will work on the group, which adjoins the Camp Bird veins, near Ouray.

D. Wood, manager of the Ouray Chief mine, has inaugurated a plan to allow the employees of the mine a bonus of 10% of all dividends declared in addition to their regular wages.

PARK COUNTY.

(Special Correspondence).—The placer season here has been cut short on account of scarcity of water. There has been considerable advance in placer mining at this point this summer in increase of operations, and a larger number of men employed and more gold taken out for the length of time.

The Snow Storm Hydraulic Co. at Alma have made extensive improvements. They have an excellent plant for the operation of their properties with electric lights for their grounds and pits. They put in their plant and had same in operation in three months. They intend spending \$85,000 in the development of their properties.

The London mine, probably the best producing mine at Alma, has started a new tunnel of 800 feet. The work is being done with power machinery and drills. This mine has produced ore running as high as \$500 per ton the past year, we are informed.

The Bucksin properties—Cleaner, Criterion and Ohio Bonanza groups—have gone or about to go into a syndicate which has already put men at work cleaning up around the Winrow mill, which they propose changing into a cyanide plant.

The Kentucky Belle, also in Bucksin gulch, is operating the Sherman, a small stamp mill, producing a carload of concentrates per week.

J. Moynahan of Alma is leasing on the

Champaign-Fannie in Mosquito gulch doing tunnel work. He is driving the fourth tunnel, which is now in 350 feet, to cut a shoot that produced considerable good ore in the third level, running over \$500 per ton. He expects to strike same in the next 25 feet. Mr. Moynahan is also working the Faulkland on Bross mountain and intends cutting the Mooso dike, which has produced something like \$3,500,000. This property has not been worked since 1893 until the present time.

The Oliver Twist mine has let a contract for 150 feet crosscut in its tunnel. Alma, August 1.

Breckenridge citizens have 6000 acres of oil lands and have organized the International Oil Co., incorporators G. H. Evans, G. C. Forsythe, W. H. Snelson, J. H. Marks, R. L. Gore.

Near Alma, W. H. Smith & Co. of Denver, who have the Mount Bross Con. G. M. Co. mill, will have a cyanide equipment placed in the mill to save 90% values in the ore.

SUMMIT COUNTY.

Superintendent T. Harris of the Oro Grande Placer M. Co. at Dillon has the pit down over 70 feet. They have two Evans hydraulic elevators at work, with two flumes.

At Breckenridge, G. H. Evans, manager Gold Pan Co., plans next season to open up with five flumes, into which will pour continually as many streams of gold-bearing gravel and sand, fed by four hydraulic elevators and one mechanical elevator, the capacity of the plant to be 8000 cubic yards daily.

TELLER COUNTY.

The tonnage as given out by the various mills and smelters treating Cripple Creek ore is as follows for July:

	Tonnage.	Average value.	Total value.
Smelters.....	13,500	\$60.00	\$810,000
U. S. R. & R. Co.	20,000	30.00	600,000
Union.....	12,000	28.00	336,000
Portland.....	5,000	30.00	165,000
Economic.....	4,700	31.50	148,050
Dorcas.....	2,800	27.50	77,000
Telluride.....	2,750	25.00	68,750
Aequa.....	900	11.69	10,521
Brodie.....	250	8.00	2,000
Totals.....	62,500		\$2,217,321

Manager C. C. Hamlin, Granite G. M. Co., states that the company is starting work in the south drift of the eighth level to open the ore chute recently exposed in running the ninth level south. The ore is running from \$33 to \$67 a ton.

G. P. Goodier, manager Oro Verde M. & M. Co., on the Clear Creek slope of Yankee hill, is developing through a crosscut tunnel a group of mines.

J. F. Burns, president Portland G. M. Co., says that during the month of May, 1901, the Portland pumped 19,000,000 gallons of water in one month and never said a word about it in the papers. That was at the rate of about 4500 to 4600 gallons a minute, which is double what the Elkton or any other mine of Cripple Creek district has ever handled. The water flow was exceedingly heavy, but they were able to handle it. They say they had to handle it and went after it and said nothing about it. They drained the property and then ran out the levels. When they came to sink the shaft again they found some water, but it was not so great as during that month. "There is too much talk," he thinks, "about water in the Cripple Creek district."

Superintendent W. Bainbridge of the El Paso mine, in speaking of the necessity for the tunnel, cites the case of the Ontario tunnel, at Park City, Utah. That tunnel was driven a distance of 4 1/2 miles to cut the Ontario mine at the depth of 1400 feet. The work was performed by the Ontario Co. single-handed. The mine has produced something like \$34,000,000 and paid in dividends about \$14,000,000. Cripple Creek has produced \$100,000,000 and paid in dividends \$30,000,000. In the Record he says he thinks the best place to start the drainage tunnel is down Cripple Creek a half mile up from where it empties into Four Mile. A tunnel from that point would have to be driven 1 1/2 mile, where the granite rim would be cut. There the water could be tapped, which would give immediate relief to a good portion of the district; survey shows that it would cut the Elkton shaft at a depth of 2135 feet below the collar of the shaft, while Bull hill would be cut at about 3000 feet. This tunnel, to drive as far as the Elkton mine, would cost about \$1,250,000. There is another tunnel site that would be about three-quarters of a mile shorter that would cut the Elkton at 1400 feet. That could be driven for about \$800,000. With the water that is being thrown now that goes down by the site of the tunnel, sufficient power could be obtained to operate all the machinery necessary to do the work. Mr. Bainbridge says: "If a drainage tunnel is not driven the outcome of the entire situation will be that a few companies will own the district and will do it themselves. It only stands to reason that such is the case, and for the very reason that eventually if the companies keep on pumping they will reach the point where they are at a greater expense in pumping than the profit derived from the ore. When that point is reached they will be forced to suspend. The capitalist will take in everything he can, and he will obtain them cheaply; then he will drive the tunnel and derive the benefit. The reason that a tunnel driven from the Cripple Creek point would be better than one from any point east is the fact that it will cut through the entire system of dykes. By running farther east it would run with the dykes, which would be better left undone."

Suit has been filed in the Federal Court by the Portland G. M. Co. against the Monument G. M. Co. for damages. The claims of the two companies are located side by side in the Cripple Creek district. The complaint alleges that a vein which apexes in the Tidal Wave claim of the Portland Co. is being worked by the Monument Co. and that ore to the value of \$250,000 has already been taken out. Such vexatious and costly litigation will continue till the repeal of the apex law.

The half yearly statement of the Anaconda M. Co. shows results of the company going on the leasing system and suspending operations on company account. For the first six months of the year there was shipped from the property 3614 tons of ore, valued at \$92,358.35. Of that amount lessees shipped 3198 tons of ore, the gross value of which was \$83,625.12. From that amount the company received in royalties \$13,827.19.

Manager A. Wagner of the Pharmacist Con. M. Co. reports the main shaft has been sunk by the Mitchell Leasing Co. 90 feet, total depth 660 feet. The same lessees have drifted and crosscut 250 feet on the seventh or lower level. Arrangements are now made to sink the main shaft an additional 200 feet, from which depth—860 feet—crosscuts will be run to the vein. All of the debts, including the Zenobia judgment of \$2 100 and interest, have been paid. "We have a cash balance in the treasury of \$1,081.71, with no debts."

IDAHO.

PRODUCT OF GOLD AND SILVER BY COUNTIES FOR THE CALENDAR YEAR 1901.

County.	Gold		Silver		Total Value.
	Fine Ozs.	Value.	Fine Ozs.	Value.*	
Ada.....	1,032	\$21,333	517	\$668	\$22,001
Bannock.....	182	3,762	48	62	3,824
Bingham.....	639	13,209	64	83	13,292
Blaine.....	939	19,411	99,186	128,240	147,651
Boise.....	18,104	374,243	6,325	8,178	383,421
Cassia.....	1,758	36,541	215	278	36,819
Custer.....	897	18,543	73,086	94,495	113,038
Elmore.....	4,457	92,134	2,209	2,856	94,990
Idaho.....	7,810	161,448	3,008	3,889	165,337
Lemhi.....	10,335	214,057	2,238	2,894	216,951
Lincoln.....	1,979	40,910	198	256	41,166
Oneida.....	485	10,026	94	122	10,148
Owyhee.....	38,912	804,382	1,065,167	1,377,186	2,181,568
Shoshone.....	4,915	101,602	4,339,296	5,610,403	5,712,005
Washington.....	286	5,912	83	107	6,019
Total.....	92,750	\$1,917,313	5,591,734	\$7,229,717	\$9,147,030

TOTAL PRODUCT OF IDAHO DURING THE CALENDAR YEAR 1901.

Metal.	Quantity.	Value.
Gold, fine ounces.....	92,750	\$1,917,313
Silver.....	5,591,734	\$7,229,717
Lead, pounds.....	162,553,069	7,314,888
Total value.....		\$16,461,918

DISTRIBUTION OF THE GOLD AND SILVER PRODUCT OF IDAHO FOR THE CALENDAR YEAR 1901 AS TO SOURCES OF PRODUCTION.

Fine ounces.	Gold		Silver	
	Quartz.	Placer.	Quartz.	Lead Ores.
	56,289	36,461	1,080,352	4,511,382
* Coinage value.				

IDAHO COUNTY.

No wagon road will be built to Thunder Mountain this year. The 100-stamp mill, which is mostly at Emmett, will all be taken there and left there. Work may be done on the wagon road next May.

OWYHEE COUNTY.

The Silver City Avalanche has news of rich strike in the Poorman.

At Silver City the Nugget says that the recently organized Owyhee G. M. Co., which took over the group of claims on the west side of War Eagle, began work on the property last week by starting to clean out the 90-foot shaft to retimber it, and while awaiting the arrival of a whim the men began taking out the old, rotten curbing. At 20 feet from the surface a vein of quartz 20 inches wide shows value of \$75 per ton.

Twelve bars, each weighing 100 pounds, were shipped from the Trade Dollar mine on the 1st.

SHOSHONE COUNTY.

In previous recent issues considerable

has been editorially said regarding "the smelter trust," the subject having been gone into at considerable length, illustrative of its tendencies and inevitable effect, with some suggestions as to what was the best course for working miners and mine owners to pursue. During the closing week in July the Shoshone county, Idaho, commissioners met as a board of equalization to listen to arguments for reducing the assessment on sundry local mining companies. According to a Wallace special, dated July 26, to the Capital News, G. Ehrenberg, manager of the Helena-Frisco, developed the fact that the company had received \$18,000 from the American Smelting & Refining Co. last year as a bonus for not running. E. H. Moffet, manager of the Standard & Hecla, stated that the Hecla received pay from the smelter trust during the time it was idle, from May 30, 1900, to the time it commenced operating, three months hence; that all the Coeur d'Alene mines that had reduced their output on account of "overproduction" received approximately \$10 on each ton of concentrates that had been cut out of their production.

D. A. Hyman, president Frisco Con. M. Co., near Mullan, says he will start work about September 1, will employ 100 men, run about two-thirds full capacity, and ship 1500 tons a month.

At Orofino, E. E. Rogers, president Gold Creek Con. M. Co., has appointed H. Caulfield superintendent of the Mascot property, and ordered immediate resumption of the work.

Nearly all the machinery for the two dredgers being put in on Beaver creek, Delta, is on the ground.

After being shut down nearly one and one-half year the Hecla mill at Gem will start up next week.

MICHIGAN.

HONGHTON COUNTY.

At Houghton the Isle Royale M. Co. has discharged 100 men, closing down No. 1 shaft and slipping two of its mill heads. The cause is attributed to the low price of copper.

At Houghton the new compressor, recently installed at the Superior engine house of the Calumet & Hecla, replacing the old compressor, is doing nearly 200% more work. This compressor plant, which

is probably the largest in the world, was originally intended to operate 500 drills, but more than 300 have never been successfully operated. The substitution of more powerful compressors will, it is believed, result in the fulfillment of the original purpose.

MONTANA.

BEAVERHEAD COUNTY.

Superintendent W. A. Helmhuether of the Montana C. & G. M. Co. states that work on the mines of that company, on Stone creek, has suspended indefinitely.

DALY COUNTY.

At a recent dinner given in honor of F. Klepetko, President Scallon of the Anaconda Co. took occasion to deny the reports that the new smelter was a failure. He claims that it has proven entirely satisfactory and has given much better results than was expected. There had been a statement sent broadcast that "the colossal smelter built by the Amalgamated Co. at Anaconda at a cost of \$900,000 is decreed a failure. The old smelter was

abandoned six months ago, and all the saleable fittings were torn out; but Amalgamated workmen are now engaged in refurnishing and refitting the old smelter, as the new one must be abandoned for purposes of reconstruction."

It is locally reported that the Amalgamated Copper Co. may be compelled to abandon the smelter at Great Falls, because of the objections of the Government to the fact that the smelter is polluting the river and making the water unfit for irrigation, and is also killing fish. It is said to be probable that all ore of the Amalgamated mines will be treated in Anaconda and that the old works may be refitted for that purpose.

FERGUS COUNTY.

The Montana & Texas G. M. Co. has properties in Moccasin mountain, nearest railroad point Lewistown, 20 miles distant from Kendall. The mine has been developed to a depth of 250 feet. The ore lies in one deposit like a mountain. One man breaks all the ore needed to run a 250-ton mill a day. It is an immense quarry. The values on top run \$6.50 a ton. The mill is turning out \$25,000 a month.

FLATHEAD COUNTY.

An item from our Cabinet correspondent in the issue of July 19, concerning the American Kootenai M. & M. Co., and the Mother Lode M. & M. Co., is objected to by an officer of those companies, who says that "those properties are being rapidly developed and opened up, and just now a completely equipped electrical drill plant is being installed on the property of the American Kootenai M. & M. Co., which will soon be in operation. Other material improvements are being made."

Four six-horse teams are hauling the product of the Snowshoe mine to the railroad at Libby. The production of the property keeps about 150 tons ahead of the teams.

Placer ground on Libby creek is being worked this year as it never has before since the early sixties. F. Whiteside and Vaughn and Greenwell have a large number of men at work, with plenty of water.

GRANITE COUNTY.

The Montana G. M. Co. is operating the Sunday claim between Drummond and Phillipsburg. There is a tunnel 350 feet long on the Sunday vein; near the face a winze is down to the 100-foot mark, all the work in ore. A carload of the best ore shipped to Butte netted \$1950.

The Henderson M. Co. has organized at Phillipsburg and will put in a new plant on the Sunrise mine.

Near Phillipsburg, Maryland men have control of the Howard Copper Co. Dehts have been adjusted and funds provided for work. H. Busch is superintendent.

LEWIS AND CLARKE COUNTY.

A waterfall for the purpose of supplying power is now being created at the headwaters of the Little Blackfoot river, 30 miles west of Helena, where miles of flumes and ditches are being constructed, by means of which a number of small streams are being brought together and carried 5 miles to the mouth of Hat creek over a fall of 500 feet. Here a power plant will be erected, and it is calculated that there will be 1000 H. P. available, the current generated to be transmitted 10 miles to the Porphyry Dike mines.

MADISON COUNTY.

Near Virginia City Superintendent Baier has dredger boat No. 2, owned by the Conrey Placer M. Co., dredging for gold. The properties of the Copper Chief M. Co. are at Silver Star. The group comprises five claims. Development work has been done on the Copper Chief, on which there are two vertical shafts, aggregating 235 feet.

W. T. Hale has a bond on a group of claims 6 miles east of De Borgia. Four tunnels are being driven on the property.

NEVADA.

ELKO COUNTY.

The Dexter mine, near Tuscarora, is employing seventy-five men, handling 130 tons of ore and 40 tons of slimes daily, in addition to development work.

ESMERALDA COUNTY.

Near Hawthorne, Supt. Colcord of the Esmeralda M. Co. has men surveying a route for a pipe line from Cottonwood canyon to Hawthorne district. As soon as the pipe line is laid, a 20-stamp mill will be built near the Pamlico mine and work on the mines begun.

HUMBOLDT COUNTY.

General Manager Dunaway of the NCO says there are 250 miners in the camp of Donnelly mountain. The road from Amedee, Lassen Co., Cal., is said to be good and water plentiful.

LINCOLN COUNTY.

The Quartette M Co. at Searchlight will sink the main incline shaft to the 750 level from its present depth at the 450

level. The train is carrying seventy tons of ore to the mill daily, making two trips. This will keep the twenty stamps dropping regularly. An 11,000-gallon oil tank to supply the locomotive is to be built. The consumption is about 1000 gallons per day.

The Duplex Co. is working thirty-four men. A 16 H. P. gasoline engine runs a 12 K. W. generator. The power developed is utilized to run the drill, fan, pump and 100 lights in the mine, mill and the company's houses. S. C. McCummings, foreman, says that with the electric drill they are putting in a round of twelve holes, each 4½ feet deep, in twelve hours. The motive power is furnished by a 2 H. P. motor, from which a flexible steel shaft connects with the drill. Starting with a 3½-inch bit, it is gradually reduced to 1½ inch. The drill itself is clamped to the column, which is in turn jacketed between the walls. Along this column the drill is movable, thus making it possible to put in a line of holes with one set-up. One man has charge of the motor and watches the drill, while another is at the controlling handle which governs the feed.

The Bristol Copper M. Co. reports a strike made on the 600-foot level. Development shows it to be larger than the old Bonanza ore shoot. The work has been done under the supervision of Superintendent Klingender.

NYE COUNTY.

Tonopah is locally expected to rival the Comstock, from one of whose mines—the Con. Cal. & Virginia—were extracted 119 tons of gold.

At the time of the latest issue of the Bonanza the main shaft was 380 feet deep, the crosscut 450 feet. The foundation is completed. A 40-foot galloways-frame, 12 inches square, now building, will be replaced by one of steel when the ordered material arrives.

The Tonopah N. S. T. & D. Co. is sinking a farther distance of 200 feet to the 600 level.

Tonopah proposes to incorporate as a town.

At Duckwater is reported a deposit of potassium and sodium nitrate. W. H. H. Rhodes of Stockton, Cal., G. S. Garcia and E. S. Farrington of Elko have formed a company for the development of the property and have men at work. The following is furnished as an analysis of a crude sample of the new discovery: Nitrate of potash and soda, 78%; moisture, 9.2%; iron, trace; insoluble impurities, lime, silica and alumina; contains no chlorides; reducing power as compared with niter, 72.4%.

The Lucky Jim, Jack Rabbit, Idahoan, Little Tonopah, Little Tonopah No. 1, White Elephant, Samson, Nevada Boy, Tonopah Belle, Cronje Rose and Mining Chance claims will be incorporated as the Montana-Tonopah M. Co., and comprises among its shareholders C. E. Knox, C. Morris, Dixon, Ellis & Ellis of Salt Lake, Utah, Forman Bros., A. G. Cushman, H. Gates, T. Fleming, J. L. Butler, T. L. Oddie, T. McCahe, W. Parker, L. Ellis, H. C. Cutting and J. O'Toole. It is intended to sink a double-compartment shaft within 500 feet of the Mizpah.

The Bonanza reports the main shaft of the Tonopah Co. at a depth of 380 feet; the crosscut extends 450 feet. The amount of work since January 1st amounts to 3600 feet. The foundation for the new 44 H. P. hoist is completed. At the main shaft is building a 40-foot galloways frame.

Tonopah's present population is about 3000.

STOREY COUNTY.

At Virginia, Supt. Kinkead will put on a night shift to keep the Kinkead mill running constantly on Con. Cal. & Va. low-grade ore.

WASHOE COUNTY.

Supt. Hopkins is developing the Great Western mine, at Steamboat; a 100 H. P. boiler will be put in, when he will put on a larger force.

At Reno the Nevada Mineral Exhibit Building has been closed until after the Pythian convocation. The exhibit has been sent to San Francisco.

The Con. Nevada M. Co., Wedekind, has for \$25,000 bought the Frier group of claims, southeast of the Wedekind mine. The company has two shafts down—one 180 feet deep, the other 164 feet. From the former a lateral has been run out crosscutting the south. Values running \$5 to \$8 a ton are being found.

NEW MEXICO.

GRANT COUNTY.

Lordsburg reports the United G. & C. Co. developing their Lordsburg and Virginia mines, Shakespeare district, under the supervision of B. W. Randall. The North American M. Co. is sinking on the Cohra Negra, adjoining; D. W. Briel is Supt.

The Belle and Last Chance mines, owned by the Michigan-New Mexico C.

Co., are being developed; a 150-ton concentrator will be put in; W. H. Stevens is Supt.

The International G. M. & M. Co. has designated O. R. Smith, with headquarters at Lordsburg, its New Mexico agent.

LINCOLN COUNTY.

The sale of the Old Abe mine, at White Oaks, to the Eagle M. Co. of Chicago, Ill., has been confirmed. The same company has also purchased the Helen Rae mine at Nogal. They will put in an electric power plant, operate the machinery and furnish power to other properties.

SANTA FE COUNTY.

Suit has sued to foreclose the liens on the Mountain King, Good Hope and Summit, a three-fourths interest in the Galena King and Silver King and a three-fourths interest in the Parnell mines, in the new placer district in this county, given, it is alleged, for advancing money for development purposes which, with interest from Sept. 30, 1895, amounts to \$20,899.

At Santa Fe the Pennsylvania M. Co. is incorporated, headquarters at Cerrillos, main office at Franklin, Pa.; W. A. Brown of Cerrillos is manager.

SOCORRO COUNTY.

(Special Correspondence).—The Helen M. Co., which had been closed down on account of the low price of silver, is making exhaustive tests and experiments with the cyanide process, and, if the experiments are successful, will start up again shortly. They are doing some development work in the mine at present, but not shipping any ore.

Graham, Aug. 1.

The new tramway from the Ambrosia mine to the Hardscrabble at Magdalena has been completed, a distance of 3000 feet. A chute drops the ore into the bins of the Hardscrabble and from thence by a gravity tramway into the bins on the railroad.

OKLAHOMA.

Complaint has reached the Interior Department from mine owners as to the difficulty of enforcing the law recently enacted by Congress for the protection of miners in the Territories. The law limits shots to be fired in the mines to one per day, and the mine inspector for Oklahoma says that if the law is literally interpreted the product of some of the mines, now 500 or 1000 tons per day, will be reduced to two or three tons per day. He suggests that the law be construed as if the word "one" were "once." This change, while permitting the usual number of shots, would confine them to certain periods of the day, and thus afford the desired protection to the mine workers.

OREGON.

BAKER COUNTY.

Sumpter reports the Maxwell mine, twenty-four mining claims, eight of them patented, sold to W. J. Johnson and G. L. Huntington of St. Paul, C. P. Berkey of Minneapolis and J. A. Ward of Toledo, Iowa; consideration about \$145,000, 10% cash. With the property go two mill-sites, two water rights, with ditches complete, a double set of boarding and bunk houses, assay office, ore bins, 10-stamp mill, fully equipped, stamps weighing 1080 pounds each, operated by water power, also provided with steam engine and boilers as auxiliary.

The Big Producer group of claims, Alamo district, is sold to W. R. Eisenhower, associated with J. R. Cassin, consideration given out \$15,000.

Sumpter reports ore from the Monumental mine assays 137 ounces silver, \$25 gold, 500 feet from the surface. Ore is a 4-inch streak on the foot wall. The balance of this vein assays \$25 gold and twenty ounces silver. Manager Allen is having the 4-inch streak of ore sacked for shipment.

C. R. Townsend has been engaged by N. H. Thihaut of the Don Juan to superintend operations there. The second pump used at the mine is in place and sinking will shortly commence.

In the Cracker-Oregon property Superintendent Cahle is crossing the vein to determine its width. The long tunnel has been put in condition and headwork is going on.

JOSEPHINE COUNTY.

The Hammersley or Daisy, Jump-Off-Joe creek, is out of litigation. It belongs to W. H. Emerson. The Hammersley mine will now be operated.

C. R. Ray of Gold Hill will dam Rogue river and build a ditch for mining, milling and other purposes. He has let a contract at Grants Pass for 140 M. feet lumber for the flume. It will require 500 men for a year.

The yield of placer gold from the 150 hydraulic mines, Josephine district, for this season, is reported 40% greater this year than in any past season, due to the heavy rains. Nearly all of the hydraulic

mines increased their equipment last summer.

At the Victor Junior mine, Grave creek, twenty stamps are to be added, a new hoist, engines, boilers, drills and a cyanide plant put in.

Platinum discoveries have been made in the Meredith placers of the Illinois district. The platinum of the Illinois is found with the black sand deposits on the serpentine bedrock.

The Eureka mine of Soldier creek has installed a 10-stamp mill.

The Golden Drift M. Co., which own and operate the Dry Diggings hydraulic mines, are building a power dam across Rogue river, 3 miles above Grants Pass.

LANE COUNTY.

The Le Roy M. Co., head of Champion canyon, Bohemia district, will put in air compressor drills this month. The company will drive two drifts and from its lower tunnel will gain a depth of 1500 feet; it has three ledges that can be tapped from this lower tunnel.

SOUTH DAKOTA.

CUSTER COUNTY.

Shipments of mica have been resumed from Custer. For six months the mica mine owners of the district had been unable to dispose of their product at any price, and the mines had all been closed down. At Columbus, Ohio, the National Mica Co. is organized to meet the mica trust in the market for the Black Hills mica. The Black Hills Porcelain, Clay & Marble Co. of Detroit and Chicago has a written agreement with the National Mica Co. to sell the output of two mica mines at about \$75 per ton. Two hundred tons have been taken out of one of the mines, and is being shipped to Columbus. The two mines will give an output of three tons of mica per day. The books are uniform in size and are desirable for electrical purposes on account of freedom from iron.

LAWRENCE COUNTY.

The Homestake M. Co.'s 285th consecutive dividend is 50 cents per share—\$102,000—a total of \$15,388,950, without missing a monthly payment during twenty-three years and nine months. There are 900 stamps at work, one cyanide plant of 1200 tons capacity operating at Lead and another of 750 tons capacity almost ready to run at Gayville, these being designed to handle the tailings of the stamp mills. It is locally estimated that there is ore enough blocked out above the 1100-foot level in the mine to run the present mills for twenty-five years.

UTAH.

BEAVER COUNTY.

At the Ben Harrison Manager Trenam will put in an 80 H. P. boiler, 6x8 foot hoisting engine, a 10 H. P. upright engine, an exhaust blower and a six-drill air compressor.

IRON COUNTY.

G. E. Gunn, sent out by smelters to make reports on iron properties, states that, from present appearances of iron properties at Iron Springs, he would regard the proposition of furnishing iron ore for flux for smelters rather unfavorable, unless better showings are made.

JUAB COUNTY.

Near Eureka the Grand Central has decided to build an aerial tramway from the mine to the railroad, a distance of about a mile. The cost of the undertaking is estimated at \$20,000; it will have a capacity of 100 tons a day.

Litigation between the Bullion-Beck and the Gemini is settled out of court, the Gemini paying the Bullion-Beck \$30,000 and dismissing its counter claim. Through a mistake in the surveys each party had been extracting ore from the grounds of the other.

SALT LAKE COUNTY.

The Eagle & Blue Bell property may be transferred to the Bingham Con. Co. at \$2 50 per share for the capital stock. The Eagle & Blue Bell group adjoins the Centennial-Eureka, and like that property carries high-grade siliceous ores.

The Bulletin reports last week's product of the Bingham Con. smelter to be 124,000 pounds copper.

SUMMIT COUNTY.

Following are the shipments of ore from the Mackintosh sampler for the past week:

	Pounds.
Daly-West	3,541,000
Ontario	976,000
Anchor Con.	395,000
Total	4,912,000
Silver King	2,464,840

Total 7,376,840

At Park City the Record reports that at the California Superintendent Getsch has twenty-one men on a double-compartment

mont raise from the lower tunnel. The \$45,000 indebtedness will be cleared off.

TOOELE COUNTY.

At Marcus, Manager Bothwell of the Sacramento mine says that next month production of quicksilver from the recent find will be begun.

WASHINGTON.

FERRY COUNTY.

The Ohio G. M. Co., Republic, is showing well under development. Manager G. Pfunder has active charge of the work. Republic and Spokane are now joined by a daily train service.

At Republic the Quip is shipping ore. There are 2500 tons on the dumps.

Manager De Lashmott of the Princess Maud mine at Republic reports on the 650-foot level a pay shoot 4 feet wide, 90 feet long and 100 feet high. The ore will be shipped to the smelter.

PIERCE COUNTY.

The Tacoma Smelting Co., controlled by D. O. Mills and associates, will doubtless secure possession of the Tacoma Smelting & Refining Co.'s Tacomas smelter, having bid \$255,000 for its entire property. The sale of the smelter property was brought about by a litigation which followed the leasing of the plant by the Tacoma Smelting & Refining Co. to the Tacoma Smelting Co., the latter company having been formed by Mills and others two years ago to work the ores of a number of mines controlled by his syndicate. After the smelter was leased to the Tacoma Smelting Co., minor stockholders objected to the lease and took the claim into court. The litigation which followed became expensive; and to straighten out the tangle, it was finally decided to sell the smelter property. Of the two bids, one was from the Mills Co. and the other for \$250,000 from E. McGurran. As the Mills Co. has made the highest bid, and is also in possession, it will doubtless secure the smelter.

STEVENS COUNTY.

T. H. Schwelzer has a contract to supply the Canadian Smelting Works at Trail, B. C., with the lime rock necessary for fluxing purposes. The rock will be mined at the Northport quarries, for which the supply for the Northport smelter is now taken.

J. D. Farrell has bought thirty-one iron claims at Valley, north of Spokane, for \$30,000. The deposit carries 68% iron.

The King Copper & Gold M. Co., operating near Valley, will put in a four-drill compressor.

SNOHOMISH COUNTY.

At Silverton the Bonanza Queen Co. has completed a compressor plant; two drills are in operation; 300 feet has been driven. It is expected to drive this tunnel 600 feet farther to tap the ore body. R. V. Stretch is consulting engineer of the company and is preparing plans for flue line, tramway and concentrator plant with Manager A. W. Hawks.

WYOMING.

CARBON COUNTY.

At Grand Encampment T. H. Tracy of the Mine & Smelter Supply Co. is superintending enlarging the smelter to a capacity of 500 tons daily, and building a concentrator at the Boston-Wyoming smelter plant. The concentrator, 500 tons daily capacity, will be built in five parts—table room 50x18 feet, crushing and sizing room 60x70 feet, breaker room 20x20 feet, power house 20x20 feet; another ore bin of 500 tons capacity will be erected.

The North American C. Co. will install a 1000 H. P. plant.

The construction of the aerial tramway to the Ferris-Haggerty mine progresses. The towers have been built 14 miles out and two tension stations on the fourth section erected.

FOREIGN.

BRITISH COLUMBIA.

At Texada Island the Van Anda is preparing to start up. An English company has the property. Two pumps are unwatering. The iron property there is shipping to Port Townsend. Seventy-five men are at work on the island.

Rosland's output of ore for the week ending August 2 is low, owing to the closing of the Le Roi for three days following the death of the late Superintendent Dunkle. The Le Roi sent out 2925 tons; Le Roi No. 2, 1470; War Eagle, 150; Giant, 150. Total for week, 4695 tons; year, to date, 189,631 tons.

At the Consolidated Cariboo Hydraulic Co.'s mine, Bullion, Cariboo district, Manager Hobson has an electric system to run the drills and light the pit and camp. The bedrock has been blasted out for 900 feet and a bedrock flume laid. This is the first season that any attempt has been made to wash the bedrock gravels; to do so it was necessary to blast out the bedrock. Close to the dump the flume is 70

feet below the surface of the bedrock and 20 feet at a point 900 feet farther up. The bedrock is an extremely hard red dolomite and in places red porphyry. Three electric motor drills were used to do the drilling. One of these drills puts in an 8-foot hole in 45 minutes.

C. H. Fisher of the Fisher Maiden-Troy Mines, Ltd., says that ore is being sacked preparatory to shipping to the smelter at Nelson or Trail. The company has a Crown grant for the group of claims comprising the Fisher Maiden property. To make the property productive as soon as possible and to assist in paying expenses of development, instead of continuing the tunnel under the old workings, a second tunnel has been started directly under tunnel No. 1. If the ore shoot of tunnel No. 1 is found to be continuous in tunnel No. 2, it is estimated that 17,050 cubic feet of ore will be blocked out between the two tunnels. Estimating 10 cubic feet of ore to the ton, would give 1705 tons. If assay values of \$80 to the ton are maintained, this block of ore would be worth \$136,000.

At Boundary Falls Manager Goodell of the Montreal & Boston Copper Co. is handling the ore from its Sunset mine and will add a second furnace to the smelter, capacity 500 tons a day. The new furnace will be 40x176 inches, of water jacket construction.

At Nelson a lease is closed for the Silver King mine for one year to M. S. Davis, formerly superintendent of the property, by the Hall M. & S. Co. The mine had been closed for several months.

About 110 tons of ore have been brought from the Eureka Copper Co.'s Comstock property, Quatsino sound, to the Crofton smelter, the first over-sea consignment to the Northwestern S. & R. Co. The Yreka Co. have decided not to ship any more ore from their Quatsino property until the aerial tramway has been constructed from the mine to the waterway.

From Rosland Manager MacKenzie reports that the estimated profit for June of the Le Roi amounted to \$87,000. First-class ore sent to the smelter, 11,479 tons, containing 6800 ounces gold, 11,100 ounces silver and 501,100 pounds copper, estimated profit, \$66,000; second-class ore shipped from dump, 3200 tons, giving 1590 ounces gold, 1693 ounces silver and 73,500 pounds copper, estimated profit, \$21,000.

MEXICO.

CHIHUAHUA.

Mining companies in the Minaca and Jesus Maria districts, Chihuahua, propose to connect the two places by a narrow gauge railway.

MICHOACAN.

J. G. Collinson, Supt. Louisa C. & G. M. Co. and Santa Emilia Copper Co., in a report dated July 1st, says of the work at Dona Louisa: Work has been driving in north side tunnel, now in 31 meters; timbering costs 86 cents Mexican per meter. The proposed winze will be sunk in ore. The tunnel face is being driven by contract at \$5 Mexican per meter.

SINALOA.

A company of Americans, headed by N. B. Atwood, has been organized with a capital of \$2,000,000 for the purpose of developing mining claims about 40 miles northwest of San Jose, in Sinaloa. Included in this work is the construction of a tunnel through a mountain for a distance of about 2 miles. It is estimated that the cost of constructing this tunnel will reach about \$5,000,000.

J. A. Kilton, an American, has a concession from the Government for metallurgical works at Matehuala, to smelt 200 metric tons of ore daily. The plant will cost about \$100,000 gold. The terms of the concession require that the works shall be in active operation by the end of 1903.

SONORA.

New York men have closed a deal for the purchase of the silver mines owned by the Corona M. Co. Horace Gerber of Parral, Mexico, one of the owners of the Two Republics mine in Sonora, is at the head of a company which proposes to erect a large mill and smelter in Sonora.

Thomas F. Turner of Canton, O., has closed, on behalf of a New York company, several mining deals, one for the purchase of the Progreso and Colorado mines, in the vicinity of Batuc, Ures district, ores principally high-grade silver. The Colorado mine is an extension of the Progreso. The price paid for the Progreso is \$100,000, Mexican money, and for the Colorado \$30,000. The reduction plant of P. Osterman at El Cajon, near Susqui de Batuc, and the Zaragosa mine, in which P. Osterman was interested, are included in the deal. The Mina Grande and Santa Teresa properties, 18 miles southeast of Hermosillo, carrying copper ores, were also among the properties secured, price \$100,000.

In Magdalena district, the American-Mexican Copper Co. has bought from J. B. Storman copper properties in the Gua-

raguave mountains, 11 miles from Llano station. The Gold Galore M. Co. has also acquired from him gold properties 15 miles westward from the same station. The copper properties include 485 pertenencias of ground, carrying 6% copper. The gold property embraces 157 pertenencias, ores averaging \$15 gold. A railway 26 miles long, crossing and connecting with the Sonora Railway at Llano, is included in the enterprise. Of the American-Mexican M. Co., C. W. Warfield, of San Diego, California, is vice-president, and J. Lightner, of the same place, secretary.

ZACATECAS.

Norwood & Erikson, Americans, who own mines in the Sombrete district, have a concession from the government of the State of Zacatecas for building and operating smelters near Chalchihuites to cost about \$1,000,000.

SOUTH AFRICA.

Consular Agent Gordon cables from Johannesburg that a majority of the Chamber of Mines there favors the imposition of a coast duty of \$1.80 per case on dynamite, to protect local factories. A strong minority desires free trade. The annual consumption is 300,000 cases. Mr. Gordon thinks United States factories should compete for this trade, and requests cable quotations from manufacturers for blasting gelatine and No. 1 dynamite, 30,000 cases yearly, five-year contract, delivered at an African port. These figures, he adds, apply to one group of mines only.

A. Kinkead states that the milling plant of which he is manager, near Johannesburg, crushes 2500 tons of ore every twenty-four hours, and that contracts have been let for increasing the ore-handling capacity to 5000 tons in twenty-four hours. When this addition is made the mill will have a complement of 880 stamps. The ore carries an average gold value of between \$7 and \$8 per ton. The company has sunk drill holes to a depth of 4800 feet, which show the ore continues even below that depth.

THE PHILIPPINES.

J. D. Hartwell, formerly of Philipsburg, Mont., now prospecting for gold in the Philippines, says he saw some gold ore in Bagio Benguet province a short time ago that was rich. The streak from which the rock was taken is only one-half inch wide, but full of gold.

Personal.

J. D. HAGUE is in San Francisco.

E. W. CLARK is manager Ophir Hill mine, Ophir, Utah.

A. LEJUNE is manager Brunswick M. & M. Co., Pitkin, Colo.

W. A. ADAMS is manager Rambler-Cariboo Co., Kaslo, B. C.

C. H. PALMER is in Idaho examining the Copper Queen group.

ERIC MORRISON is manager Silver Wave M. Co., Danby, Cal.

THOS. FINNEGAN is superintendent Del Monte M. Co., Yuma, Ariz.

M. P. DALTON has returned to Denver, Colo., from an Eastern visit.

HENRY NESS is foreman Nutting Smelting Co., West Jordan, Utah.

W. D. PARKER is the new manager Ophir mine, Stateline, Utah.

J. E. PRICE has returned to Denver, Colo., from Jacksonville, Or.

G. T. RIVES is examining mining property near Guaymas, Mexico.

J. R. WALLS is the new manager Arizona mine, Silver City, N. M.

D. G. DICKINSON is superintendent Butterfield M. Co., Osceola, Nev.

E. C. UREN has returned from Spokane, Wash., to Grass Valley, Cal.

MENNO UNZICKER is now in charge of the Cable Cove mine, Sumpter, Or.

JAMES CRONAN has been appointed superintendent Bodle mine, Bodle, Wash.

W. D. HIGGINBOTHAM is superintending placer operations at Whiterock, Nev.

JOHN GARVEY will superintend reopening Blue Gravel placer mine, near Yreka, Cal.

A. MAZE succeeds H. D. Trennam as superintendent Stockton mine, Stockton, Idaho.

H. CANFIELD has been appointed superintendent Mascott property, Oro Fino, Idaho.

S. A. EASTON of San Francisco is assistant manager Bunker Hill Co., Kellogg, Idaho.

EDMUND PRIOR, B. C. Minister of Mines, is touring the Boundary, B. C., district.

ALEXANDER BARING of London, Eng., is visiting the North Pole mine, Sumpter, Or.

W. P. DUNHAM has been elected gen-

eral manager Independence Con. M. Co., Colorado.

N. BOSSEN is consulting and electrical engineer Calumet & Hecla M. Co., Calumet, Mich.

PROF. N. R. LEONARD, president Montana School of Mines, has returned there from the East.

J. L. WELLS has resigned the superintendency of the Con. M. & S. Co., Cerrillos, New Mexico.

C. M. SAIN of Lovelock, Nev., has returned from a visit to his mineral properties near Oregon.

JOS. SCEILI is superintendent Black Bess M. Co., Twin Lakes, in Big Cottonwood canyon, Utah.

F. W. BATES of Bogart & Bates, engineers, has returned to Seattle, Wash., from San Francisco.

H. C. CROUCH has been elected assistant professor mechanical engineering, University of Colorado.

F. M. DOWNER of Longmont is said to be slated for the position of assayer of the mint at Denver, Colo.

S. W. KEMPTON has returned to Los Angeles, Cal., from an examination of Ely, Nev., mining property.

CHAS. W. COMSTOCK has resigned the chair of mining engineering at the State School of Mines, Golden, Colo.

BEN STANLEY REVETT has returned to Breckenridge, Colo., from an eight months' trip to Africa and Asia.

W. WESTON of Denver has been making an examination of the Druid Co.'s property, Clear Creek county, Colo.

J. H. STURTEVANT of Denver, Colo., supersedes D. F. Wedekind at the Great Western Co.'s property, Copley, Cal.

TITUS CORKHILL is superintendent Boston & South Dakota Co., Lead, S. D., where he is operating the Minerva mine.

W. M. BLOOMER is superintendent Northwestern G. M. & M. Co., who own the Scott and O. K. tunnels, Wall Street, Colo.

JOSEPH H. YOUNG is the new superintendent of the Rio Grande Western Ry., with headquarters at Salt Lake City, Utah.

F. R. CULBERTSON has gone from San Francisco to Dedrick, Trinity county, Cal., where his Chloride-Bailey mine is situated.

E. G. WILLIAMS, engineer and superintendent Caribbean Manganeese Co., Colon, Republic of Colombia, S. A., is in Auburn-dale, Mass.

JOHN H. MACKENZIE says he will retain the management of the Le Roi Co.'s business at Rosland, B. C., and Northport, Wash.

W. M. SIDNEY is local manager at Georgetown, Colo., for the East Argentine Tunnel, Mining, Milling, Power & Transportation Co.

E. W. HAYNES, president Chicago & Sonora G. P. M. Co., is at Saqui Grande, Sonora, Mexico, superintending construction of sluices, dumes, etc.

W. L. BELL has resigned the superintendency of the Candelaria M. Co., Juarez, Mexico, and gone to New South Wales in a similar capacity.

J. H. COLLIER has resigned as Supt. Tesla coal mines, Tesla, Cal., and has charge of a cyanide plant at the Golden Eagle mine, Hayden Hill, Cal.

E. B. SAWYER has resigned his position with the Horseshoe M. Co., Pluma, South Dakota, because of the serious illness of his father, and is at present residing at Lincoln, Neb.

LEO VON ROSENBERG left New York on August 2 for Colorado to examine several mining properties in that State. Later he will visit California and go thence to Mexico.

PH. REARDEN, late Supt. Kurtz-Chaterton mines and mill, at Encampment, Wyo., has been appointed superintendent Coldwater and Kalamajor C. M. companies, at Pearl, Colo.

T. P. CULLEN, formerly with the Northern Pacific Railroad at Helena, Mont., has been appointed superintendent Los Angeles, Cal., division of the Salt Lake, Utah, road vice A. R. Oster.

R. A. PARKER, president Am. U. & L. S. Co., who has been seriously ill, finds his removal from Boston to New Mexico enabled his recovery from pleuro-pneumonia. He is now at Fort Churchill, Nev.

PROF. SAMUEL B. CHRISTY, dean of the mining college, University of California, has returned from New York City. While there Prof. Christy was the recipient of the highest honors and degrees in the gift of Columbia College.

TITUS ULKE, metallurgist of the Clergue works at Sault Ste Marie, Ontario, is at Grand Forks, B. C., with a proposition to treat its blister copper at

the Clergue refinery. The monthly output is 1500 tons of blister copper, including the gold and silver values. At present the product is treated in New Jersey.

A. E. WELBY, of Salt Lake, Utah, gets \$12,000 per annum in his new position as general manager Peruvian railroad interests of the McCune-Haggin firm. The first lot of material he will buy will be 110 miles of eighty-pound steel rails with all fastenings and necessary track material; 290,000 cross ties; six locomotives of special construction; twenty-five coal cars; twenty-five dump cars; fifty flat cars; twenty-five box cars; ten hand cars; one combination baggage and mail car; two second-class coaches; two first-class coaches; three cabooses.

MONTANA'S Governor has appointed the following as delegates to the Mining Congress to be held at Butte next month: W. A. Clark, John Gillie, C. W. Goodale, H. L. Frank, T. W. Buzzo, F. A. Heinze, W. Scallon, D. B. Gillis, Butte; W. G. Conrad, L. S. Stockett, Great Falls; W. R. Allen, Anaconda; W. J. Stevens, Missoula; S. A. Barbour, Glendale; P. Fusz, Granite; P. Missigbrod, Garnet; E. Larable, Deer Lodge; D. G. O'Shea, Red Lodge; E. W. King, Lewiston; O. A. Sparta, Hassell; D. P. Bowers, Libby; D. Folsom, White Sulphur Springs; R. W. Noble, Whitehall; L. Spanheim, Basin; C. W. Hoffman, O. M. Chisholm, Bozeman; T. S. Hauser, A. Burrell, J. Byrne, H. Welch, Helena; W. W. Morris, Pony.

Commercial Paragraphs.

W. R. MARTIN, Western representative F. C. Austin Manufacturing Co., has an \$80,000 contract to drill four wells 1000 feet deep for water at Cairo, Egypt.

ALFRED ATWOOD, chief engineer Rio Tinto Co., Huelva, Spain, is reported as desiring catalogues, etc., of American machine tools, sawmill machinery and general railway material and track tools. There is a demand reported for shovels, jacks, hammers, trucks (2-foot gauge) and all kinds of material used in the mines. Other large firms in that district are Campania de las Minas de Binton, Huelva; Minas del Banco de Castilla, Penarroya; Sociedad de Gararoz, Galaroz; Huelva Central Copper M. Co., Ltd., Cueva la Mora; Rio Tenido Copper Mines, Ltd., Huelva; Minas Pena del Herrero, Rio Tinto; Campania Minera Soliel Conada, Huelva; Tharsis Sulphur & Copper Co., Ltd., Huelva, Tharsis and London.

THE Crocker-Wheeler Co. of Amper, N. J., is finding an ever-increasing demand for its various lines of direct-current machinery. A new building, now half way to the roof, will nearly double the present capacity, and by clearing out many small machines in the main shop will permit of the placing of new and heavier machinery to accommodate larger sized generators and more rapid work on large orders for the smaller standard machines. The new building is of brick, slow burning mill construction, three stories in height and intended for the winding departments and light machine tools. The proprietors write: "A portion of the basement space will be used for the experimental laboratories whence emanate the changes in design that maintain the reputation of Crocker-Wheeler apparatus for embodying features which the best of engineering experience approves."

THE W. J. Clark Co. of Salem, Ohio, who make the improved fire hose couplers known as the "Quick as Wink," report a fine trade in those couplers lately. The demand for them has been growing steadily since their first introduction some years ago, but too slow for much profit until within the past few years. The couplers have advertised themselves splendidly in cities and towns where they have been in use, so that now the demand for them has made it necessary to increase facilities for turning them out. The Clark Co. are to be congratulated on the excellent satisfaction their couplers have given in towns and cities where they have been in use. In some sections it has been and still is difficult to get fire departments to make a trial of the improved couplers, on account of the general supposition that there can be nothing better than the screw couplers which are in common use. The manufacturers write that in every case where a trial of the "Quick as Wink" couplers has been made, screw couplers have been discarded and the "Quick as Wink" retained, their greater convenience of use, quicker action, unflinching durability and reliability for service commending them to practical men.

Recently Declared Mining Dividends.

Payable.
Bunker Hill & Sullivan M. & C.
Co., Idaho, dividend No. 68,
\$9000.....Aug. 8

Latest Market Reports.

SAN FRANCISCO, Aug. 8, 1902.

METALS.

SILVER.—Per oz., Troy: London, 24½d (standard ounce, 925 fine); New York, bar silver, 52½c, refined (1000 fine); San Francisco, 52½c; Mexican dollars, 43½c San Francisco, 41½c New York.

At Denver, Colo., S. Guggenheim, who is there looking after the interests of the American Smelting & Refining Co., of which he is an official, says that the company has just closed the sale of 20,000 ounces of silver to the Mexican Government, in addition to 5,000 ounces recently delivered. He declares that the first sale increased the market price of the metal 2 or 3 cents, and predicts a still greater rise as a result of the late deal.

COPPER.—New York: Standard, \$11.50@11.60; Lake, 1 to 3 casks, \$11.75; carload lots, \$11.50; Electrolytic, 1 to 3 casks, \$11.75; carload lots, \$11.60; Casting, 1 to 3 casks, \$11.75; carload lots, \$11.50. San Francisco: \$14.00. Mill copper plates, \$17.00; bars, 18@24c. London: £52 12s 6d spot, per ton.

LEAD.—New York, \$4.12½; Salt Lake City, \$3.50; St. Louis, \$4.00; San Francisco \$4.50, carload lots; 4½c 1000 to 4000 lbs.; pipe 5½, sheet 6, bar 5½c; pig, \$4.75. London: £11 1s 3d per ton.

SPELTHER.—New York, \$5.37½; St. Louis, \$4.50; London, £18 15s per ton; San Francisco, ton lots, 5½c; 100-lb. lots, 6½c.

ANTIMONY.—New York, Cookson's, 9½c; Hallett's, 8½c; San Francisco, 100-lb. lots, 10c; 300 to 500 lbs., 11c; 100-lb. lots, 13@15c.

TIN.—New York, pig, \$28.60; San Francisco, ton lots, 30½c; 1000 lbs., 30½c; 500 lbs., 31½c; 200 lbs., 35c; less, 32½c; bar tin, 3½c. London, £127 10s spot.

PLATINUM.—San Francisco, crude, \$18.00 per oz.; New York, \$18.50 per Troy oz. Platinum ware, 75@80c per gram.

QUICKSILVER.—New York, \$48.00 large lots; London, £8 15s; San Francisco, local, \$46.00 per flask of 76½ lbs.; Denver, \$50.00. Export, \$44 50.

BABBITT METAL.—San Francisco, No. 1, 10½c.

ALUMINUM.—New York, No. 1, 99% pure ingots, 35c; No. 2, 90%, 30c to 4½c.

SOLDER.—Half-and-half, 100-lb. lots, 20c; San Francisco, Plumbers', 100-lb. lots, 16½c.

NICKEL.—New York, 50@60c per lb.; ton lots, 45@48c.

STRUCTURAL MATERIALS.

IRON.—Pittsburg, Bessemer pig, \$22.50; gray forge, \$21.50; San Francisco, bar, 3c per lb., 3½c in small quantities.

STEEL.—Bessemer billets, Pittsburg, \$32 and \$33; open hearth billets, \$34.00; San Francisco, bar, 7c to 12c per lb.

CHICAGO CURRENT QUOTATIONS.

Bessemer.....	\$23.50@24.50
Foundry Northern 1.....	22.00@23.00
Northern 2.....	21.50@22.50
Northern 3.....	21.00@22.00
Southern 1.....	21.40@22.65
Southern 2.....	20.65@21.65
Southern 3.....	20.15@21.15
Forge.....	19.65@20.65
Charcoal.....	24.00@24.50
Billets, Bessemer.....	33.00@34.00
Bars, iron.....	1.85@1.93
Bars, steel.....	1.75@1.85
Rolls, standard.....	28.00@30.00
Rails, light.....	34.00@40.00
Plates, boiler.....	1.90@2.00
Tank.....	1.75@1.80
Sheets, 26 store.....	3.25@3.40
No. 27.....	3.35@3.50
No. 28.....	3.45@3.60
Angles.....	1.75@1.80

CEMENT.—Germania, \$2.75; K. B. & S., \$2.75; Hemmoe, \$2.70; Trowell, \$2.70; Portland, \$3.25 per bbl.

LIME.—Santa Cruz, \$1.85; Roche Harbor, \$1.85 per bbl.

LUMBER.—(Retail): Pine, ordinary sizes, \$20.00@22.00; extra sizes higher; redwood, \$22.00@23.00; lath, 4 feet, \$4.25 @4.50; pickets, \$19.50; shingles, \$2.35 for No. 1 and \$2.00 for No. 2; shakes, \$13.50 for split and \$14.50 for sawed; rustic, \$26.00 @32.00.

NAILS.—Per keg (list prices): No. 20d to 60d, Wire, \$3.50; Cut, \$3.50; 10d to 16d, Wire, \$3.55; Cut, \$3.55; 8d, Wire, \$3.60; Cut, \$3.60; 6d and 7d, Wire, \$3.70; Cut, \$3.70; 4d and 5d, Wire, \$3.80; Cut, \$3.80; 3d, Wire, \$3.95; Cut, \$3.95; 2d, Wire, \$4.20; Cut, \$4.20. Special rates for carload lots.

GENERAL SUPPLIES.

POWDER.—F. O. B. San Francisco: No. 1, 70% nitro-glycerine, per lb., in carload lots, 15½c; less than one ton, 17½c. No. 1*, 60%, carload lots, 13½c; less than one ton, 15½c. No. 1** 50%, carload lots, 11½c; less than one ton, 13½c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2* 35%, carload lots, 9c; less than one ton, 11½c. No. 2** 30%, carload lots, 9c; less than one ton, 11c. Black blasting powder

in carload lots, minimum car 728 kegs, \$1.50 per keg; less car lots, \$2 per keg. CAPS.—3x, \$5.50 per 1000; 4x, \$6.50; 5x, \$8; Lion, \$9, in lots not less than 1000. FUSE.—Triple tape, \$3.60 per 1000 feet; double tape, \$3.00; single tape, \$2.65; Hemp, \$2.10; Cement No. 2, \$3.00; Cement No. 1, \$2.65, in lots of 3000 feet and up.

CANDLES.—Granite 6s, 16 oz., 40s., 10c per set; 14 oz., 40s., 9c.

COAL.—San Francisco, coast, yard prices: Wellington, \$8; Seattle, \$6.50; Coos Bay, \$5.50; Southfield, \$8.00. Cargo lots, Eastern and foreign: Wallend, \$7.00; Brymbo, \$7.50; Pennsylvania, hd., \$14.00; Scotch, \$8; Cumberland, \$12; Cannel, \$11.50; Welsh Anthracite, \$13.00; Rock Springs, \$8.50, long ton; Colorado Anthracite, \$14.00. Coke, \$13 per ton in bulk, \$15 in sacks; Sunnyside, \$11 50, long ton.

CHEMICALS.—Cyanide of potassium, 98%—99%, jobbing, 27@28c per lb.; carloads, 25@26c; in 10-lb. tins, 38c; sulphuric acid, in carboys, 66% B, 2c per lb.; soda ash, \$2.00 per 100 lbs.; hyposulphite of soda, 2½@3c per lb.; blue vitriol, 5½@6½c per lb.; borax, concentrated, 7@8c per lb.; chlorate of potash, 12@13c; roll sulphur, 5c; alum, \$2.00@2.25; flour sulphur, French, 2½@2½c; California refined, 1½@2c; nitric acid, in carboys, 8c per lb.; caustic soda, in drums, 3@4c per lb.; Cal. s. soda, bbls., \$1.25 @1.50 per 100 lbs.; sks, \$1.05; chloride of lime, spot, \$2.50@2.60; nitrate of potash, in bbls, 8c; caustic potash, 10c in 40-lb. tins.

OILS.—Linseed, boiled, bbl., 73c; cs., 78c; raw, bbl., 71c; cs., 76c; lots of 5 bbls., 1c less; Lucol oil, boiled, bbl., 64c; cs, 70c; raw, bbl., 62c; cs, 67c. Kerosene—Pearl, per gal., 20c; Astral, 20c; Star, 20c; Extra Star, 24c; Eocene, 25c; Elaine, 22c; Water White, in bulk, 13½c; Mineral Seal, iron bbls, 19c; wooden bbls., 22½c; cs, 25c; Mineral Sperm, cs, 26½c; Deodorized Stove Gasoline, bulk, 17c; do., cs., 23½c; 86° Gasoline, bulk, 21c; do., cs., 27½c; 63° Naphtha or Benzine, deodorized, in bulk, per gal., 16c; do., in cs., 22c; Lard Oil, No. 1 bbl., \$1.00; cs., \$1.05; Neats-foot oil, bbl., 70c; cs., 75c; No. 1 bbl., 62½@65c; cs., 67½@60c; Sperm, crude, 60c; Natural White, 65c; Bleached do, 70c; Whale Oil, cs, 55c.

WHITE LEAD.—Per lb., in kegs: Five tons and over at one purchase, per lb., 6½c; 1 ton and less than 5 tons, per lb., 6½c; 500 lbs. and less than 1 ton, per lb., 7c; less than 500 lbs., per lb., 7½c; in 25-lb. tin pails, ½c per lb. above keg price; in 1 and 5 lb. tin cans, 100 lbs. per case, 2½c per lb. above keg price. Dry Lead—In bbls., 1 ton and over, 6c; do. in kegs, 6½c.

RED LEAD AND LITHARGE.—One ton and over at one purchase, per lb., 7c; 500 lbs. and less than 1 ton, per lb., 7½c; less than 500 lbs., 7½c.

ASSAY LITHARGE.—Per lb., 8½c. BISMUTH.—Subnitrate, per lb., \$1.60. BONE ASH.—4c per lb.

BORAX.—Crystal, 7c; calcined, 25c.

COPPER.—Carbonate, 20c; Red oxide, 60c.

MAGNESIUM.—Per lb., \$3.00.

MANGANESE.—(90% and over) per lb., \$1.25.

MERCURY.—Bichloride, per lb., 90c.

MOLYBDENUM.—25c. per gramme; 1000 grammes—2½ lbs.

PHOSPHORUS.—(American) per lb., 80c.

SILVER.—Chloride, per oz., 75c; nitrate, 55c.

SODIUM.—Metal, per lb., \$1.00.

URANIUM.—Oxide, per lb., \$3.50.

ZINC.—Metallic, chemically pure, per lb., 50c.

ZINC.—Dust, per lb., 10c.

ZINC.—Sulphate, per lb., .04c.

(These prices are wholesale, f. o. b. San Francisco, unless otherwise noted.)

Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

ROTARY GROOVING TOOL.—No. 705,268. July 22, 1902. A. R. Meisler, Sacramento, Cal. This invention refers to improvements in wood-working tools of the class known as "jiggers," and is designed to provide a simple, light rotary cutter, that can be held in the hands, and which is capable of use wherever an irregular groove or channel is to be cut. It is especially useful for coach and carriage manufacture where it is designed to mortise the parts intended to receive the edges of the panels the latter being curved not only along their edges, but transversely. The handle is adapted to be engaged at either end and carries a revolvable cutter turnable in a plane parallel with the handle, and it has transversely extending means between its ends for supporting the cutter. Pulley or anti-frictional devices are interposed between the flange of the shaft and the outer, and flexible connections are made between the cutter and source of power by which it is revolved.

GAME BOARD.—No. 705,778. July 29, 1902. F. E. Morrill, San Francisco, Cal. This invention relates to boards adapted for marking points for crinane and similar games. It consists of a board having two end sections and an elevated central section, each having point marking holes made in its surface and thus divided into three independent sets. Transversely through the board from one side to another is made a plurality of openings of suf-

ficient size to receive packs of cards and spring or equivalent pressure devices to prevent their slipping out too easily. Other openings are made for containing the pins used in marking counts, and these are provided with closable covers.

HYDRAULIC DREDGER CUTTER.—No. 705,784. July 29, 1902. R. A. Perry, Oakland, Cal. As signor of one-half to Atlantic, Gulf & Pacific Co., of New York and San Francisco. This invention is designed to provide an improved method in the cutters used in rotary hydraulic dredgers by dispensing with the rings, bars or support frameworks which are ordinarily employed in such cutters. In this invention the cutters are fixed to or formed upon the ends of radial arms without other attachment, and are so disposed with relation to the mouth of the suction pipe that material can be excavated and broken up and delivered into the suction pipe without any risk of clogging or necessity for stopping the machine to clear it of obstruction.

ADJUSTABLE CRUTCH.—No. 705,741. July 29, 1902. W. F. Drew, Sacramento, Cal. One-half assigned to F. G. Snook of same place. This invention is designed to provide a crutch which is adjustable for any person, tall or short, who may be desirous of using it. It consists of tubular telescopic leg portions, the outer of said portions being slotted longitudinally, and a hand-hold extends transversely between the legs and is provided with terminal bands enclosing the slotted portions. A clamp mechanism is carried by the hand-hold by which the slotted portions are contracted and locked upon the slidable parts. The upper and lower members are slidably movable to lengthen or shorten the crutch, and these parts are clamped in any desired position by screwing up the hand-holds.

New Patents.

DEWEY, STRONG & Co.'s SCIENTIFIC PRESS PATENT AGENCY, 330 Market St., S. F., has official reports of the following U. S. patents issued to Pacific coast inventors:

FOR THE WEEK ENDING JULY 29, 1902.

705,811.—INSULATOR—J. S. Allen, Los Angeles, Cal.
705,808.—FEEL TROUGH—J. W. Barnes, Beaver-ton, Or.
705,553.—HOPPLE—H. A. Bostwick, Spokane, Wash.
705,736.—RIFLE—J. H. Carl, Gilroy, Cal.
705,644.—ROTARY ENGINE—J. E. Cary, S. F.
705,741.—CRUTCH—W. F. Drew, Sacramento, Cal.
705,634.—BICYCLE—F. Good, Shelburn, Or.
705,933.—TRAP FLUSH—J. E. Key, S. F.
705,787.—FRUIT DRIER—C. J. Kurtz, Salem, Or.
705,937.—SOLDERING MACHINE—J. Lee, S. F.
705,778.—CONVEYER—W. L. McCabe, Seattle, Wash.
705,776.—GAME BOARD—F. E. Morrill, S. F.
705,784.—DREDGER CUTTER—R. A. Perry, Oakland, Wash.

Obituary.

W. S. GODBE, a prominent Utah and Nevada mining man, died at Brighton, Utah, on the 1st inst., in the sixty-ninth year of his age. To him, as much as to any one man, is due the development of Utah's mining interests.

SITUATIONS WANTED.

Chemist and Assayer with five years' experience in both mine and smelter work desires position. Technical graduate; finest references. Address "Chemist and Assayer," care of this office.

WANTED.—An all-round miner wants position as foreman. Over 23 years' experience in practical mining and handling men. Best of reference. Address Call Box 29, Welser, Idaho.

WANTED.—Employment at mine by young, experienced Assayer, Surveyor and Bookkeeper. References. Address A. H., care of this office.

Position wanted by Assayer and Surveyor at present employed in Arizona. Will go any place. Few years' experience East and West, and a good technical education. Address A. B. C., care of Mining and Scientific Press.

WISH A POSITION AS SUPERINTENDENT or Assayer. Have had experience in mining, milling, cyaniding and smelting, and in putting up and running the machinery. Can sharpen tools Jesse L. Wetmore, 644 E. Main St., Stockton, Cal.

MINE FOREMAN.—Young man (33) with 14 years' experience as a practical miner in Montana, Idaho, Black Hills, Arizona and California, energetic and possessed of fair technical knowledge, desires position with some progressive company. Fully conversant with standard air drill and familiar with all systems of timbering. Would like position where progressive methods applied to economical extraction would be appreciated. Foreign countries not objected to. First-class references as to ability and general reputation. Address C. M. A., care Mining and Scientific Press.

A technically educated Mining Engineer, at present employed as superintendent of mines for one of the largest corporations in Mexico, desires a change of position to the United States about July 1st. Has had 18 years' successful experience as engineer and superintendent, never having made a failure; 36 years of age; strictly temperate; a skilled designer, geologist and metallurgist; and a practical miner, as well as a hard worker and thorough business man. References of the highest order, including present employers. Address Supt., care this office.

EXAMINATION OR SUPERVISION of Mines, Smelters and Mills.

Mining Engineer and Metallurgist, of unquestionable reputation and long experience, now permanently residing at Seattle, Wash., will accept or take general supervision of mines, smelters or mills, in Pacific Coast States, British Columbia or Alaska, as consulting engineer, for reliable parties. Is also reliable accountant to examine. Box 813, Seattle.

THE CALIFORNIA DEBRIS COMMISSION having received application to mine by the hydraulic process from Mrs. C. W. Porterfield and Jos. A. Jeffery, in the Hunker Gravel Mine, near Emigrant Gap, Nevada County, Cal., to deposit tailings in Diamond Creek, gives notice that a meeting will be held at room 96 Flood Building, San Francisco, Cal., on August 25, 1902, at 1:30 P. M.

MINING AND SCIENTIFIC PRESS

Whole No. 2195.—VOLUME LXXXV.
Number 7.

SAN FRANCISCO, CAL., SATURDAY, AUGUST 16, 1902.

THREE DOLLARS PER ANNUM.
Single Copies, Ten Cents.

Electrolytic Extraction of Copper.

In connection with the Marchese process, the electrolytic extraction of copper sulphides by various solvents has been investigated, and in connection with the Hopfner process the electrolysis of cupric chloride solutions has been studied. The London Electrical Engineer is authority for the statement that an artificial cuprous sulphide containing some cupric sulphide was electrolytically extracted with sulphuric acid of sp. gr. 1.225 (acid of maximum conductivity). On electrolysis, the ore being made the anode, a slime is deposited on it, which soon stops the current. This slime contains free sulphur, but it is shown from the analysis of the slime progressively deposited that the solution of the copper takes place in the two phases: (a) $\text{Cu}_2\text{S} + \text{SO}_4 = \text{CuSO}_4 + \text{CuS}$, and (b) $\text{CuS} + \text{SO}_4 = \text{CuSO}_4 + \text{S}$. Using current densities up to 30 amperes per square decimeter the sulphur could not be oxidized. Rise of temperature favors the passage of the current. The same cuprous sulphide was electrolytically extracted with 4.5 N sodium hydroxide, the sulphide in this case being the cathode. The sulphur passes into solution, leaving metallic copper in the residual slime. Since the slime in this case has not a high resistance, the potential remains nearly constant throughout the electrolysis. The current yield is at first good, but falls off, and it has further been observed that the current yield decreases as the current density rises. The cathode slime can then be easily dissolved electrolytically in sulphuric acid, and as it contains little sulphur the previous disturbing factor is removed. The electrolysis of cupric chloride was carried out with a solution of this substance, using a platinum cathode and a carbon anode in a porous cell. When the solution is stirred, it is found that rapid stirring diminishes the yield for a given current, but the copper deposited is purer because the cuprous chloride formed by the dissolving of separated copper by the cupric chloride is washed away from the deposit. In a series of experiments, the solution circulated through the electrolytic cell and passed into another vessel containing a copper plate, and the rate at which the copper dissolved was measured. To obtain constant results, the liquid must always circulate at the same rate. Addition of hydrochloric acid diminishes the current yield, but leads to a pure copper, because the cuprous chloride formed is retained in solution. When the concentration of acid is very

great, the current yield begins to increase slightly. Sodium chloride added to the solution also diminishes the current yield, but not to anything like the same extent as hydrochloric acid; the deposited copper is very pure. The current yield diminishes as the concentration of cupric chloride increases, and the copper deposited becomes more impure, for more cuprous chloride is formed, and it may even happen that cuprous chloride alone is deposited. It is not advisable, however, to diminish the concentration too much, for then the copper is deposited in a very spongy form. At a temperature of about 12° , the deposited copper is spongy; a coherent deposit is obtained at 25° , but as the temperature rises above this, the current yield diminishes and the deposit is not so pure. Increase of current density slightly increases the current yield, because the solubility of the copper in the electrolyte is almost independent of this density. At very high current densities, however, the current yield falls on account of the separation of hydrogen at the cathode. A deposit containing up to 99.98% of copper can be obtained from a solution containing 0.1 gramme-molecule of cupric chloride, 0.1 gramme-molecule of hydrochloric acid, and 0.4 gramme-molecule of sodium chloride per litre.



Mine Santa Maria del Oro, Durango, Mexico.

A Colorado Granite Quarry.

A granite quarry has been opened up on the line of the Colorado Midland Railway, within a few miles of Leadville, which is worth noting, the blocks being of unusual value on account of their peculiar formation. L. S. Atkinson of Colorado Springs began the active development of the quarry and the first building of any importance to be erected of the granite will be the new city hall of Colorado Springs, Colo.

It is a pure gray granite of even quality, stratified into layers of from 6 to 36 inches, and cut by nature into blocks as true as if by modern sawing machinery, running back into the mountain $\frac{1}{2}$ mile from its face where stratification was discovered. The wear of the weather has exposed the upper part of the deposit, allowing easy location of the stratified formation 1500 feet, and blasting and examination prove that there is neither change in stratification, color nor quality of the granite as far back as the investigations progressed. The close resemblance of the stone to Barre granite has resulted in the change of the name of the railroad station to Barre and the naming of the quarry "Colorado Barre."

The process of quarrying the granite is peculiar and interesting. An alley is blasted back into the mountain a short distance and, working in this, the quarrymen drill lines of holes in the natural bed of the perpendicular strata. Feathers and wedges complete the cutting, bars adjusted and the blocks, perfect and ready for placing in the walls, pried off in big layers. No blasting is found necessary, once the alley has been opened. The released blocks are hoisted by derricks and placed in the small cars ready for loading upon flat cars on the railroad below. Tests and measurements show that the natural beds of the released blocks are as true as if cut with saw or tooled off by hand. The variation in the thickness of stratified formations supports the claim that to follow building specifications it is but necessary to follow one or two of the layers of the required thickness, only using saw and tools for special pieces. For the accompanying view we are indebted to the courtesy of the Monumental News of Chicago.

Mine Santa Maria Del Oro.

The mine illustrated herewith is 56 miles from Rosario, the railroad terminus, and is near the divide between the Nazas and Florido rivers. A pyritic smelter is in operation and is a success. The furnace operating has been a forty-ton water jacket; recently replaced by a new sixty-ton furnace. The matte goes to Aguascalientes. The ore runs well in gold with a little silver and $\frac{1}{4}$ of 1% of copper.



Face of Granite Quarry at Barre, Colo., Showing Almost Perpendicular Strata.

MINING AND SCIENTIFIC PRESS.

ESTABLISHED 1860.

Published Every Saturday at 330 Market St., San Francisco, Cal.
TELEPHONE, DAVIS 771.

ANNUAL SUBSCRIPTION:

United States, Mexico and Canada.....\$3 00
All Other Countries in the Postal Union.....5 00

Entered at the San Francisco Postoffice as second-class mail matter.

Chicago Office (Telephone, Harrison 73).....737 Monadnock Block.
Denver Office (Telephone, Olive 733).....606 Mack Block.

J. F. HALLORAN.....Publisher.

San Francisco, August 16, 1902.

TABLE OF CONTENTS.

ILLUSTRATIONS—Mine Santa María del Oro, Durango, Mexico; Face of Granite Quarry at Barre, Colo., Showing Almost Perpendicular Strata, 82. The Cassel Self-Governing Water Wheels for Large Powers; The Cassel Self-Governing Water Motor, 86. Cook Mine and Vicinity, "Bohtall Hill," Gilpin Co., Colo., 88. River Bed and Embankment, 300 Feet High, Site of Restraining Barrier, Yuba River, Cal.; The Narrows, Yuba River, Cal., Where Assistant Engineer Vischer Took Soundings; Section Drawn to Scale of Proposed Barrier No. 1 for the Storing of Debris, The Narrows, Yuba River, Cal., 89. Apparatus Used in Making Soundings by Boring and Suction Progress, The Narrows, Yuba River, Cal., 90. Mining and Metallurgical Patents, 91.

EDITORIAL—Electrolytic Extraction of Copper; A Colorado Granite Quarry; Mine Santa María del Oro, 82. Mining Investments; Losses of the Coal Miners' Strike; The Thunder Mountain, Idaho, Scheme; Advice Given to the Prospector; Claimants to Inventions; Cessation of Water Supply; Western Australia Mines; Age of Standardizing, 83.

MINING SUMMARY.—92-93-94-95-96-97.

LATEST MARKET REPORTS.—17.

MISCELLANEOUS—Concentrates, 84. Reformed Copper Ores; Zinc Smelters and Acids, 85. Automatic Water Motor; Diamond Drilling at Rossland, B. C.; United States Mineral Products, 1901, 86. Things to Which Miners Are Liable; Gold in a New Role; Smelting Charges, 87. Value of Ores in Mexico; In Gilpin Co., Colo.; Substitute for Platinum; Power Drills, 88. Restraining Barriers in Yuba River, Cal., 89-90. Mining and Metallurgical Patents, 91. Personal; Commercial Paragraphs; New Patents; Notices of Recent Patents; Obituary; Catalogues Received, 97.

It is to-day easier to get a mining property that will pay from 25% to 50% than to get hold of an ordinary business investment that will pay a sure 5%. And in the investment that pays 5% the investors or dividend receivers have to go down into the pockets of other men to get it—not in any wrong or dishonest way; they doubtless give and get full value, but, yet, the transaction is only a swap. The money taken from the ground is as much of a creation, so far as new money is concerned, as was the earth itself when it was created. The money so produced is an addition to the wealth of the world and helps not only him who produces, but him who receives it, and helps, too, every other industry, for every miner underground supports five people on the surface, and the bullion he produces is forevermore a part of the wealth of mankind. As for the gold miner, he produces the only thing that all men worship. Just 3303 years ago a temple was built to such worship, and it has been thronged with devotees ever since.

THE current number of Bradstreet's estimates that up to and including the first week of August the losses and expenses of the present coalminers' strike foots up \$68,190,000. While this is probably an exaggerated estimate, there is sufficient truth in the statement to show the tremendous loss that such a strife entails. The expenses of war are often cited to show the need of peace, but here is an industrial war that piles up losses in blood and treasure which tend to equal those of costly campaigns, and emphasize the need of arbitration and mutual agreement. In times of profound peace and busy industrial activity there is unavoidably a constant war of competition and individual pressure that is hard to stand and fearfully destructive to those unable to withstand it. Such conflicts as the prolonged one between Eastern coal miners and operators wreak ruin fully as dreadful as that between opposing armies in battle, and embrace in their destructive scope thousands of innocent outsiders.

THE froth is blown off the Thunder Mountain, Idaho, scheme. It is not without merit, but has been crudely "boomed." Early in the season the transportation companies saw a good chance for business; but, whatever the possibilities of the camp, the thing was almost immediately overdone, so far as miners making money out of it was concerned. At present the whole country is staked out by men who don't have to do any work thereon for ninety days, and some of whom expect to be able to enlist

the attention of capital. It is argued that already some moneyed men have put up so much that they can not afford to let the thing drop; but it is not well to count too much on that. There is an abundance of water, timber, high-priced provisions and disappointment, but little actual mining, and it is not a good place for a poor man. Later on, when there is more doing, when a stage line is in and people quit telling about wonderful finds of platinum, quicksilver, etc., that country may "boom" in the real acceptance of the term, but that will be after the glittering advertisements of fortunes made in a week come out of Eastern papers, and the men who do the mining get to work, if the prospects then justify it.

THE prospector has about as much advice given him as anybody. And considerable of it is worth just what it costs. There is advice enough on hand now to run him for a while. What he really needs more than good advice is good example. During 1902 he has been told, numerous, "Develop your claims." Might it not be well to bestow a little such admonition on the investor. Ordinarily the only thing that keeps a prospector from developing his claims is lack of money. Sometimes the man who buys the prospect for a very little and makes a mine out of it tells the prospector he was foolish to sell so cheap, which is adding insult to injury. In such a paper as this it is never of any use to point out a defect or want, without proffering a remedy or aid for its need. In this case the most likely benefit would be to interest the probable investor, not so much in buying a mine—a "going mine," as our European friends would say—as in developing mines. There is really more in it for capital in making a mine for itself than in paying big money for a property already developed and paying. For this reason this paper views with favor the organization of development companies that have ample money to invest, knowledge enough to invest it sensibly, and business patience enough to not be in too big a hurry for returns. Good mines can be made in the way indicated. There are plenty good prospects that deserve development, but it is little use to tell the prospector "Develop your claims." He has done pretty well to discover them. If he had the money to develop his claims, probably he wouldn't be a prospector. He is trying hard enough to develop them, but the way indicated would be more in the line of good business.

As is usual in all such cases by the American Co., since Marconi has demonstrated the commercial value of wireless telegraphy a host of claimants to the invention arise. Whatever domain of science shows advance is always thickly populated; whatever the invention there is sure to be "others." And naturally, indeed, inevitably so. In many inventions the device as perfected is necessarily built up on several experimental efforts on the part of men who have preceded in time the invention. Every one of those who are now said to have invented or discovered wireless telegraphy before Marconi have doubtless considerable claim to respectful attention. But as it was Marconi who first made practical demonstration, so it will be he who will always be associated in the public mind with the marvelous system of electric communication that he first gave to the world. There were steam engines before Watt, steamboats before Fulton, telephones before Edison, yet we always think of those men in connection therewith. Even a dwarf standing on the shoulders of a giant can see further than the giant himself. Whenever a new invention is made it is in the air. Progress, painful and obscure, has made that invention possible. A hundred keen intellects, apart and unconnected, are working on the same problem, and oftentimes two or more make the same discovery almost simultaneously. In this case Marconi developed the idea and first made it practical. To him, therefore, should be given much credit. And meanwhile credit should not be withheld from all or any of the patient investigators, pioneers in the pathway of slow science that made Marconi possible.

CESSATION of water supply in many parts of the Western mining country causes temporary suspension of placer mining and hydraulic operations in general, so far as actual output is considered; but

the general tenor of our correspondents' reports this week is to the effect that such enforced suspension will be utilized to good advantage in preparation for increased work next season, made possible by enlarged ditch and flume capacity and purchase of improved hydraulic mining appliances. Meanwhile, many other workers thus afforded temporary respite are using the time to good advantage in doing necessary assessment work to hold their own outlying claims, and others are only glad of the opportunity to "go prospecting." The fascination of a prospecting trip is known only to those who have been in one, and little wonder that the chance to thus get out is so eagerly seized by those who thus become the pioneer of the miner and all the industries the latter creates and maintains. The bulk of Western American gold has come from the placer mines, and while from the nature of things gold quartz mining will some day equal in value the placer product, there are even yet undeveloped and undiscovered areas of placer ground that will prove profitable. Every August, when the water runs low, there is a scattering out from closing-down placer properties that results the following year in the opening up of new prospects to add in their turn to the great aggregate of gold production.

THE West Australia report of the Department of Mines for 1901 contains some things noticeable in connection or contrast with similar publications issued in this country, illustrating tendencies and requirements usually absent in this country. Elaborate tables show the "averages of gold ore raised and ounces of gold produced therefrom per man employed," from which it is learned that "per man employed under ground" there were in 1901 raised 182.35 tons gold ore; "per man employed above and under ground," 93.87 tons. The number of ounces gold produced "per man employed under ground" were 209.89, and "per man employed above and under ground" 108.04. Comparison is made with similar tables for former years and the conclusion drawn "that better work is being done by the miners, and that more systematic methods of mining and ore reduction are practiced." During the year 20,895 men were engaged in mining, 11% of the population. In that time there were 175 miners killed and injured; there was a death rate of .34 of 1% per 1000 employed above ground, and 4.6% of those employed under ground. The State of West Australia gives aid to mining by building cyanide plants, and by offering subsidies for deep sinking. Values are given of the mining machinery erected in the different districts during the year, all mentioned being noticeably different from American custom in this regard, but not without value and doubtless in accordance with local requirements.

THIS is the age of standardizing. Weights, measures, instruments, machinery and other things are rapidly being standardized, and it would seem well to have advertising literature standardized, too. Nearly every mining machinery manufacturer and dealer feels it incumbent on him to get out what is called a "catalogue," though the splendid trade treatise of to-day does not deserve to be discredited by that name, for the brochures produced are sumptuous in style and finish, being expensive in proportion to their elegance. This office gets about three a day, approximating a thousand annually, and tries to keep some of them. So also do other offices and individuals, and the mining machinery men themselves essay retention of their rivals' literary productions. The time has arrived when it would be well to have some standard sizes for these handsome treatises. In the thousand or so annually received there are over 100 different sizes. It would enhance their value and be of manifest benefit if such idea were put in practice. As it is at present each one is a law unto himself. Some of the larger manufacturing and supply houses have already taken up the plan of issuing their catalogues in one of three sizes—either 3½x6 inches, 6x9 inches, or 9x12 inches. Six by nine inches is a good size, large enough for almost any such purpose and convenient to file. The idea is worth considering. Those catalogues are costly affairs and anything that would tend to get back at least the original investment is in order. The sizes suggested have been already recommended by many of the engineering societies of the United States.

Concentrates.

THE metric ton contains 2204 pounds.

THERE is no Norway iron now imported to this country.

ENGINEERING, commercially, is the art of making a dollar earn the most interest.

FREIGHT RATES from average Arizona points to El Paso, Texas, are about \$5 per ton.

THE tin ore at Temescal, Cal., is cassiterite or tin oxide, in fissure veins in granite formation.

IN hoisting a bucket that produces 900 pounds stress upon the manila rope, a 1½-inch rope would be the right size.

ASBESTOS FIBER, containing any portion of the non-fibrous rock, could enter the United States free of duty.

SHOULD a patent be issued for a millsite the fact that a vein or lode is afterward discovered on it does not invalidate the patent.

JADE or nephrite occurs in seams of trap rock in Wild Cat canyon, Esmeralda county, Nevada. The quality is dark, fine texture and takes a good polish.

SINCE the first issue of this paper the highest price paid for copper was in July, 1895—55 cents per pound; the lowest in June, 1894—9 cents per pound.

CANADA produces about half the world's supply of nickel. Now Caledonia, Norway, Austria, Germany and Spain yield about 40% of the refined product.

TRUE malachite has been found in considerable quantity at the Dixie copper mine, Washington county, Utah, and the Copper Queen mine, Bisbee, Arizona.

THE Mount Morgan, Queensland, Australia, gold mine treats about 18,000 tons ore per month, using the chlorination method and averaging nearly one ounce gold per ton.

AN unpatented mining claim is not subject to State or local taxation, but by subterfuge the assessor often taxes the possessory right, which often amounts to the same thing.

THE Stora Kopparberg M. Co. of Sweden has records showing the transfers of shares in the stock organization in 1288. It was chartered by the Scandinavian Crown in 1347.

A CONTINUOUS ELECTRIC CURRENT flows like a stream of water steadily in one direction. An alternating current flows by rising to its full voltage and then falling to its least.

ELECTRICIANS whose standing and reputation give value to their opinions express the belief that it is possible to insulate and transmit power at 100,000 volts for any distance required up to 400 miles.

WATER at ordinary temperature will act on cement, dissolving out .0014% of lime, but, percolating continuously through porous mixtures of cement and sand, will in time dissolve so much lime out of the cement as to weaken its cohesion.

IF when retorting quicksilver it flows or is greasy, it can usually be restored by covering it with about an inch thick layer of pulverized coke, or, better still, pulverized charcoal, the retorting to be done very slowly and at as low a temperature as possible.

FREIGHT on zinc ores from Colorado to Europe would be about \$10 per ton. Zinc ore carrying, say 55%, would be worth about \$30 per ton delivered at Antwerp. The Kootenay district in British Columbia has shipped lead concentrates to Antwerp via St. Johns, N. B.

JASPER is common in Utah, Nevada and Oregon, and near Burns, Cal., is a large dike of green jasper which cuts across a large area of country. This jasper takes a fine polish. Yellow, red, brown and green jasper are found in Nye county, Nevada, and Utah county, Utah.

IN a gas engine, when coupled to a dynamo, the gas used to drive it for the production of electricity yields three times as much light in incandescent lamps and about eleven times as much in arc lamps as the same amount of gas would give off if burned directly at gas jets.

THE longest span in any American electrical power transmission line is that of the Bay Counties Power Co., across Carquinez straits, between Suisun and San Pablo bays, California—4448 feet, at a height of 236 feet above high water mark. The transmission involves 40,000 volts carried 182 miles.

WHERE the ownership in the locations and the tunnel is the same, assessment work on one or more claims, whether adjacent or not, can be done upon a tunnel planned to cut the veins claimed in the locations, even though the entrance or some of the line of the tunnel is off the surface locations.

CALAMINE is the hydrous silicate of zinc. Its color is bluish, green or brown. It is transparent or translucent and has a vitreous or sub-pearly luster. Its gravity varies from 3.16 to 3.9; its hardness is 4.5 to 5. Its composition is zinc oxide, 67.5; silica, 25; water, 7.5. With the blowpipe it gives off fumes of zinc on charcoal which cover the coal.

REGARDING the use of sodium in blowpipe analysis there are different methods of using sodium as a reducing agent. Some prefer the following simple manner of operating: A piece of sodium, 3 to 4 mm. in diameter, is flattened out, the powdered substance to be tested pressed into it with the hammer, the whole turned over

with the blade of a knife, kneaded into a ball, placed upon a cavity in the charcoal and ignited, when with a flash the reduction takes place momentarily.

IN the case of the firm of New York brokers against Straub, the New York Supreme Court decided that delivery of a check on a bank does not constitute an assignment of the funds in the bank of the drawer of the check, and that a person withdrawing the amount to his credit in the bank by a second check, but prior to the payment of the first-drawn check, does not commit larceny.

COAL GAS is explosive when mixed with air in the proportion of one volume of gas to sixteen of air, this being the inferior limit at which combustion will take place when the gases are fired at atmospheric pressure. Any proportion between this and one volume of gas to four of air may be ignited at atmospheric pressure. The best mixture to use in an engine is about ten to one of gas, though this is necessarily subject to variation on account of the different qualities of gas produced from coals of different grades.

THE easiest and most economical way to increase the power of a steam engine is to increase the boiler pressure, but it is necessary to be sure that such additional pressure may be carried, and that can only be ascertained by careful and rigid inspection. It takes but a trifle more fuel to carry steam at 110 pounds per square inch than it does at 100 pounds, but no increase of power can be obtained without an increased consumption of fuel. In the way instanced, it would not be necessary to increase the speed of the engine, nor change the driven pulley on the line shaft, simply meeting an increase of resistance by an increase of steam pressure.

A PNEUMATIC rock scraper is an appliance in use on a gold dredger. The dredger on which it is used consists of three pontoons, instead of two, so that two wells are provided. One well accommodates the bucket ladder, the other the pneumatic scraper. The apparatus consists of an iron tunnel, swinging upon an axle, which allows the lower end of the tunnel to be raised or lowered at will down to a depth of 65 feet. The tube is let down flush onto the bottom after the buckets have done their work, and the water is then expelled by pneumatic pressure. Men can then enter the tunnel and work at the bottom, scraping out the cavities in the rock which can not be reached by the buckets.

IN Colorado the statute fixes the miner's inch as equal to a quantity of water flowing from an inch-square orifice under a pressure of 5 inches above the top of the orifice, and assumes that the quantity of water delivered is proportional to the area of the orifice; but this is far from being true. For instance, if a flow of 144 miner's inches be required, the volume obtained would be 3.3, 4.2 or 4.7 cubic feet per second, according as there were 144 holes 1 inch square, one opening 1 inch deep and 144 inches long, or one opening 12 inches square, the tops of all openings being 5 inches below the surface of the water. Weir measurements are more accurate, and could be substituted for the method by orifices.

A DIRECT method of separating platinum from gold or silver or both is to fuse the metals, three parts of zinc by weight to one part of the other metals. The product of the fusion is to be hammered or rolled into a sheet or ribbon and immersed in sulphuric acid, which will dissolve out the zinc and leave a spongy mass ready for digesting with nitric acid of a specific gravity of 1.199 until all the silver is dissolved. After the residue is carefully washed it is further digested in a solution composed of 100 volumes concentrated hydrochloric acid, forty-three volumes concentrated nitric acid and 143 volumes of water. About the third or at most the fourth repetition of this last the gold will have gone into solution, the pure platinum still remaining undissolved. Then separate by filtration, the gold being finally precipitated by sulphate of iron.

IN every country which has a written language and a system of coinage, the abbreviation for the unit of value precedes the figures. In England the pound mark (£) is used in the same manner that the dollar mark is used in this country. In Germany the abbreviation m (for mark) appears preceding the number, just as the French abbreviation fr. (for franc) is used in France. The English pound sign is the oldest monetary abbreviation now in use, is the initial letter by which the Romans expressed "pounds," just as we use the "lbs." Moderns use money's abbreviation backward, because the Romans, in expressing pounds, always said libra decem, instead of decem libra, the first being pounds ten and the latter ten pounds. When their initial letter or character was used it always preceded the figures. Thus the whole world got in the habit of doing these things backward.

TO WATERPROOF blue prints, immerse in melted paraffine until saturated a number of pieces of an absorbent cloth a foot or more square, and when withdrawn and cooled they are ready for use at any time. To apply to a blue print, spread one of the saturated cloths on a smooth surface, place the dry print on it with a second waxed cloth on top, and iron with a moderate flat-iron. The paper immediately absorbs paraffine until saturated and becomes translucent and highly waterproof. The lines of the print are intensified by the process, and there is no shrinking or distortion. As the wax is withdrawn from the cloths, more can be added by melting small pieces directly under the hot iron. By immersing the print in a bath of melted paraffine the process is hastened, but the ironing is necessary to remove the surplus wax from the surface, unless the paper is to

be directly exposed to the weather and not to be handled. The irons can be heated in most offices by gas or over a lamp, and a supply of saturated cloths obviates the necessity of the bath. This process, which was originally applied to blue prints to be carried by the engineer corps in wet mines, is equally applicable to any kind of paper, and is convenient for waterproofing typewritten or other notices to be posted up and exposed to the weather.

CARBONS for arc lights and other carbons for electrical purposes are made from coke, this coke being a by-product of the process of petroleum refining. This material is the solid product or residuum which is left in the refining stills after the oils have been driven off. This material is calcined to free it from volatile matter, and then ground and bolted to further free it from coarse particles. In this condition it is almost pure carbon; before being molded it is mixed with a binding material. Two processes are in use for molding the carbon. In the first they are molded under hydraulic pressure in split molds, eighteen or twenty carbons being molded at once. In the second method the material is forced through dies by means of heavy hydraulic presses, the carbons being molded in 4 or 5-foot lengths, and afterwards cut to the required size. They are then baked in kilns for eight or ten days, and afterwards sorted and tested. In some cases the carbons are also thinly plated with copper by means of special machines.

MOLYBDENITE is the sulphide of the rare element molybdenum. It is not a common mineral, but it is found in small quantities in a good many localities, chiefly in crystalline rocks like gneiss. Like graphite, which it much resembles, it occurs in foliated masses or in crystalline plates having a hexagonal outline, rarely in distinct hexagonal crystals. It is also very soft (H. = 1—1.5) with a soapy feel, and leaves a trace on paper. It has a bluish-black color and metallic luster. The color, however, is distinctly bluer and the specific gravity (G = 4.7) is higher than that of graphite. The composition of molybdenum disulphide, MoS₂, gives: Sulphur, 40; molybdenum, 60 = 100. Heated in the open tube or on charcoal, it gives off strong sulphur fumes and yields a deposit, which is pale yellow or white, of molybdic oxide; this coating on charcoal, if touched with an intermittent blowpipe flame, becomes a bright blue. Molybdenum also occurs in the salts called molybdates, of which lead molybdate, the mineral wulfenite, is the most common.

THE transmission lines of a system like the Bay Counties Power Co. of California, with lines 150 miles long, have a capacity of about 3 microfarads. Operating at 40,000 volts, this will have $\frac{1}{2} \times (3 \times 10^{-6}) (40,000 \times \sqrt{2})^2 = 4800$ watt seconds = 4800 joules = 3500 foot-pounds of energy stored in its energy storing capacity when fully charged. The charging current is 45 amperes at 40,000 volts, 7200 alternations. Therefore the rate of supply of energy to the line from the generator and absorption from the line by the generator is $45 \times 40,000 \times 2 \times \frac{1}{\pi} = 1,150,000$ watt-seconds per second, = 1,150,000 joules per second, = 843,000 foot-pounds per second. The generator supplies current continuously to the line for $\frac{1}{2}$ alternation and then receives it back again for the next half alternation. Therefore the energy delivered or received in a half alternation is the energy stored in the capacity of the line $\frac{45 \times 40,000 \times 2}{\pi \times 60 \times 4} = 4800$ watt-seconds = 4800 joules = 3500 foot-pounds, as before.

ZINC is often used in boilers and hot water tanks to prevent the corrosive action of the water on the metal of which the boiler or tank is composed. The action appears to be an electrical one, the iron being one pole of the battery and the zinc being the other. Under the action of the current of electricity so produced, the water in the boiler is slowly decomposed into its elements—oxygen and hydrogen. The hydrogen is deposited on the iron shell, where it remains. It will not unite with iron to form a new compound, but, if any iron rust is present, it will remove the oxygen from this and deposit the metallic iron on the plates. The oxygen of the water that is decomposed, instead of going to the iron, goes to the zinc, and in the course of time the zinc will be found to be almost entirely converted into oxide. On account of the action outlined, it is generally believed that zinc is always a good thing to prevent corrosion, and that it can not be harmful to the boiler or tank under any circumstances.

TO DETERMINE the amount of coal that it is possible to burn in one hour on each square foot of grate surface, multiply the square root of the height by two and subtract one from the product; the result will be in pounds. With the chimney 144 feet high, the answer is twenty-three pounds. But in ordinary practice it should not be over 60% of that. Taking the twenty-three pounds, however, the maximum quantity, as a basis, where there are 90 square feet of grate surface that would give 2070 pounds per hour as the maximum quantity of coal that can be burned. The area of chimney in square feet is found by dividing the pounds of coal burned per hour by the square root of the height, multiplied by 12. In this case it would be $2070 \div 144 = 14.4$ square feet. The diameter of a round flue that would contain this area is found by dividing by .7854 and extracting the square root of the quotient: $14.4 \div .7854 = 18.5$, the square root of which is 4.3 feet. The horsepower of boilers that may be operated by that chimney can be determined by dividing the coal burned by 5: $2070 \div 5 = 414$ H. P.

Reformed Copper Ores.

NUMBER III.—CONCLUDED.

Written for the MINING AND SCIENTIFIC PRESS by J. C. GOODWIN.

On examination for the origin of the reformed ores I find a great iron gossan dike on the contact between the rhyolite and limestone. This now is what is left of a great sulphide dike or vein. If one enters a shaft and is lowered to the 200-foot level, on examining this dike or vein at this depth he will find the dike to be a sulphide dike, in which the iron sulphides carry but a small per cent of copper. He will find the dike to be soft, and this will tell him that something has been removed by water after decomposition; he will find blue streaks running down the sides of the dike. The copper sulphides are breaking up and forming copper sulphates, a soluble salt. Copper sulphides decompose easier than iron sulphides, but in the decomposition of the iron sulphides it forms not only a soluble sulphate, but sulphuric acid. Although iron sulphide is soluble in sulphuric acid, it does not pass to a lower level, along with the copper sulphates, to form ores of iron. The reason is this: The hanging wall of this dike or vein is calcium carbonate, and it is slowly being dissolved by rain water containing carbon dioxide. The calcium carbonate in this water acts upon the sulphuric acid and iron sulphate, forming iron carbonate and calcium sulphate. Calcium sulphate being soluble in water, passes on down and may be carried thousands of feet before being deposited. The sulphuric acid acts upon the calcium carbonate wall also. The copper sulphate being soluble is carried slowly down until it reaches the permanent water level. At this level in the Bisbee mine you will find much of wall rock has been changed by the solutions that originally deposited the sulphides, into calcium and magnesium silicates. The sulphates of these copper salts acting upon these wall rocks replace them with native copper and copper oxides.

Calcium sulphate, magnesium sulphate and siliceous acid go into solution. The siliceous acid is found associated with the copper ores in a hydrated form. Not all of the iron sulphate was precipitated as it was being broken up, but some of it was carried below and deposited in the same manner as the copper salts, forming oxides. You may expect to find similar zones of enrichment in mines that have one wall of an alkaline earth, and you may expect to find this zone at or just below water level, and a gossan dike leading to the sulphides. The reason of this is that the solution that precipitates the metals is an alkaline solution, so in the Bisbee mine you find condition as I have described, but all the conditions under which ore is found in Bisbee are not the same. All of the ore is not found in the contact or in the limestone, but a great body extends eastward many feet into the felsite, a very siliceous rock.

Here we do not expect the reformed ore to be the same kind because conditions are different. In the breaking up of the iron and copper sulphides soluble salts of iron and copper were formed with an acid solution. The solution that leached out and carried down these salts being acid, attacked the iron sulphide and hydrosulphuric acid is given off. The hydrosulphuric acid precipitates the copper sulphate as a sulphide with the formation of sulphuric acid. Thus it is seen that the three processes of disintegration, liberation of sulphuric acid and reformation of the ore as a secondary deposit are continuous, and that the low-grade chalcoprites are broken up and changed into chalcocite, a high-grade ore. Chalcocite is only found where the wall rocks are siliceous and not easily acted upon by the acids.

The solution from which the chalcocite was deposited contained the iron as a soluble sulphate. This sulphate was carried off by this solution and it may have been deposited lower down or have been carried on into the gulch below. As one passes from the partially decomposed sulphides near the 200-foot level down to or near the water level, they pass through the oxides and metallic zone of enrichment which I have described. If one descends to the 800-foot level in the Spray shaft he would find at that depth a great body of sulphides of iron and copper chalcoprites many feet wide. The dike or vein at this depth is undecomposed and as it was originally formed. The ore has for a hanging wall altered manganese and calcium carbonates mixed with manganese calcium silicates. The foot wall is not definitely defined, as the ore insensibly gradates into the rhyolite. For, as you pass from the hanging wall eastwardly through the dike or vein, after quite a number of feet the ore becomes leaner in copper sulphides, and if one was to explore far into the rhyolite dike at this depth they would find it very siliceous and pyritiferous, for every indication goes to show that the whole of this rhyolite dike is pyritiferous, but all surface indications that I have examined lead me to believe that little copper pyrite is associated with the iron pyrite.

There is an indication that is always found where great dikes which contain iron and copper pyrite dis-

integrate. For example, near Glohe, in Gold gulch near the Black Warrior property, are great deposits of sand and gravel cemented together by copper carbonates.

Miners have broken up this conglomerate mass and sorted out the cement copper and shipped it to smelters. If you examine a large hill which rises above this conglomerate mass, you will find it a felsitic porphyry impregnated with copper and iron pyrites. In the disintegration of this hill the iron and copper sulphates were formed and water carrying them down precipitated the copper as a carbonate, the iron being precipitated as a ferric oxide farther down the gulch. One will always find at the base of felsitic porphyry or other pyritiferous rocks great beds of sands and gravel cemented into a conglomerate; if copper is present the whole mass is green, but if no copper is present the mass is cemented together with the red oxide of iron; so on examining one of these concretionary deposits, if no stains of copper are found, you may say with certainty that no copper exists as a pyrite in the surrounding rocks.

By comparison I will give the conditions as nearly as I understand them of some of the great copper producing mines of the West. Let us examine the United Verde mine.

At the surface it is a quartz gangue vein containing some carbonates of copper. Originally this vein contained iron and copper sulphide ores. These ores in decomposing formed an acid solution and the copper reprecipitated as copper sulphide under the conditions that I have described.

There being some alkali earths associated with the vein and country rock, some carbonates and oxides are formed. Nothing is formed by chance, but by some law either by chemical or mechanical action.

I will quote from Arthur W. Wendt's "Copper Ores of the Southwest," in the Transactions of the American Institute of Mining Engineers; in speaking of the United Verde mine, he says: "In fact, here as elsewhere, copper glance appears not to be the true ore at all, but a production of decomposition and of secondary origin derived from leaching of veins above and subsequent concentration at a lower point. The oxidation of pyritous croppings is but a roasting carried out during ages by the combined action of air and moisture." It is true, as Prof. Wendt says, that the veins above were decomposed and the ores concentrated at a lower point, but the reason that the concentrates are in the form of chalcocite instead of an oxide is that the vein matter and country rock are silicates instead of a basic rock.

Another illustration is the Congress gold mine. The vein of this mine below the water level is quartz impregnated with a pyrite of iron carrying gold, and is a fissure vein cutting granite, a siliceous rock. From the surface to the water level the sulphides are oxidized, and cavities alone remain to show where the sulphide once existed. The reason the iron did not remain in the cropping forming the gossan vein is because the iron sulphide in breaking up formed iron sulphate, sulphuric acid and free sulphur. The sulphuric acid attacked the iron sulphide and iron sulphate and hydrosulphuric acid were formed, and the action continued until all of the sulphides of iron were broken up. The solution being acid, the iron sulphate was leached out by water and carried away. Only near the surface of the iron sulphates could any iron be precipitated as a hydroxide or carbonate. The reason is that all surface water contains a little carbon dioxide or organic acid combined with some soluble base, and this may act upon the iron sulphate after the majority of acid has been removed, and neutralized the acidity and formed hydroxides and carbonates of iron. If one of the walls of this vein had been a basic carbonate, instead of being acidic, a gossan vein would have been found instead of a honeycombed quartz vein.

An article in the July number of Mines and Minerals entitled "Secondary Enrichment," by S. F. Emmons and Weed, speaking of the Butte, Montana, region, they say: "It seems as if the copper leached out of the 400 feet of vein depleted near the surface had been concentrated in underlying ore and had thus produced a zone of secondary ore 200 feet deep containing twice its normal copper contents. The original ores of the veins are quartz and pyrite, chalcoprites and enargite. The richer sulphides, hornite, chalcocite and covellite, are of later origin." They say further that "an oxidized upper zone extending down 200 to 400 feet, containing less than 1% of copper, the value being principally silver. It is a mass of crumbled quartz, honeycombed and free from metallic oxides." The question arises as to why the decomposed vein matter left behind a mass of crumbled quartz, honeycombed and free from metallic oxides, while the vein matter in the Bisbee mines are almost entirely of metallic oxides. Prof. S. F. Emmons says that "the formation at Butte, Montana, is indeed strictly granitic, and it is said that no sedimentary rocks are found within 15 miles of Butte." Therefore, the wall rock being very acidic, the condition of the vein to-day is as we would expect the original ore of the vein having quartz, pyrite, chalcoprite and enargite. Air and moisture acting upon the pyrites and chalcoprites easily broke them up into sulphates and free acid. The solution containing

the sulphates and free acids is carried by the percolating water down along the vein.

It did not stop and deposit the minerals in any one zone of enrichment. The conclusion is the acidulated waters containing the sulphates and acids began the work of displacement at or near the 400-foot level and continued downward until the acidity of the solution became neutralized.

In this displacement the silver and copper sulphates displace the iron sulphides, molecule by molecule, the iron sulphate being carried out by the water. So it will be seen the alkalies or alkali earths have had much bearing upon the various ores as they were originally being deposited or as they were re-deposited from decomposition of the original ores.

If the Butte, Montana, mines had contained no silver or lead sulphides, only chalcoprites, there would have been no Butte to-day.

Silver sulphides are solvable with difficulty in waters and acids, lead sulphides being almost insoluble in the same. If they had been as solvable as iron and copper only a quartz vein would have been found above the 400-foot level. The same is partly true of Jerome camp. Old Dominion, at Glohe, was worked for silver to the depth of about 160 feet.

A few days ago I visited Cananea, Mexico. Among the many claims owned by the Green Mining Co. is the Copete, on the surface a great iron gossan vein many feet wide but no indications of copper on the surface, only oxide of iron; 100 feet or more below the apex of the vein was encountered in sinking a great enrichment of oxisulphide of copper.

The same conditions are found in many other of the company's claims, the country rock in this district being of basic porphyry, and there being alkali earths enough at or near the surface to precipitate the iron but not enough to precipitate the copper as oxides or carbonates.

Two great leveling agencies, wind and water, in their eminence work have exposed many mines, and because of this an expression is in the mouth of the typical prospector, "that any fool can find a mine," but the prospector of the future will be the man who has learned all that is known of the condition under which any mineral he may search for may be deposited, and these conditions can only be learned by studying and comparing the mines of the world.

Zinc Smelters and Acids.

Regarding the process of smelting zinc ores and producing sulphuric acid, the process of treatment of zinc ores is briefly as follows: After the sulphur is removed by roasting, the fine ore is placed in clay retorts, which are cylinders of fireclay 4 feet long and 8 inches in diameter, closed at one end. These fit in openings in the walls of the furnace with the open ends flush with the walls, and are arranged in rows forming a block. When coal was used for fuel, 224 retorts were placed in a block, while with gas about 600 can be placed in one block. When charged with ore, a condenser, a conical fireclay vessel about 12 inches long and 6 inches in diameter at the larger end and 2 inches at the smaller end, is so placed that the larger end just enters the open end of the retort.

As the ore mixed with powdered coke is heated, the zinc is driven off as heavy vapor, which forms in drops on the inside of the condenser, from which the metal is tapped in long ladles about three times in twenty-four hours. The molten metal is emptied into a traveling kettle and poured into molds about 9x19x1½ inches, making a 50-pound plate known as spelter.

The zinc works made their own retorts and condensers out of good fireclay mixed with one-third its weight of fragments of old retorts pulverized. The materials are mixed in a pug mill with water and then passed through a molding machine and afterwards dried in a heated room for some weeks. They are finally fired in a small furnace for twelve hours. The condensers are made in hand molds, as needed.

In the new plant of the Standard Acid Co., Iola, Kan., the zinc ore is roasted in mechanical continuous roasters composed of a seven-row muffle kiln capable of roasting sufficient to run a three-block (1800 retorts) smelter. The sulphur fumes pass into a flue where the dust is deposited, and the sulphur gas passes to a square condensing tower 49 feet high, and the heat of the gas is used to concentrate the weaker acid. The gas is then carried through a 3-inch pipe into six chambers connected tandem, 150 feet long, 20 feet high and wide, and in these condensation takes place. Into these chambers exhaust steam is admitted, and the gas passes into two absorbing towers lined with lead and filled with a checker-work of chemically prepared bricks where the nitrogen compounds are recovered. These were added in the condensing tower in the form of nitric acid to furnish oxygen.

In the lead-lined chambers the steam and sulphurous gas unite and form sulphuric acid. From the condensing towers the acid passes through lead coolers kept cool by flow of water, and it is then pumped into storage tanks and run into tank cars of 65,000 pounds capacity. Twenty of these cars are being constructed for this work.

The buildings cover twenty acres of ground. The main building is 526 feet long, 65 feet wide, with an L of 111 feet, and is 70 feet high. The plant will

treat forty-five tons of ore a day, yielding fifty tons of acid. The acid is used in manufacture of fertilizers, refining of petroleum, alum, soda ash, blue vitriol. This is probably the only plant in the United States manufacturing sulphuric acid where natural gas is used as fuel. The sulphur vapors so destructive to the vegetation around the smelters are thus made of economic importance, and, with the exhaust steam, furnish materials which would otherwise go to waste.

Automatic Water Motor.

Herewith is illustrated the Cassel automatic water motor, an impulse water wheel that presents some new features, prominent among which is a novel

rect result of its velocity, the arresting of its velocity destroys its power. Consequently when power is again required a certain lapse of time must transpire from the moment freedom is granted to the flow of water before its maximum velocity is attained, and resultantly its maximum power.

"The water in the pipe line of a hydraulic plant will weigh many tons—often hundreds of tons—when the nozzle at the end of the pipe line, where the water is delivered to the wheel, is wide open, these hundreds of tons of water will be flowing at a rate of speed necessary to deliver the water which the nozzle will discharge. Now, if the nozzle or valve admitting water to the water wheel be suddenly partially closed, the pressure of the water at that point will greatly increase until the tons of water in the

without in the least degree interfering with the free flow and velocity of the water and its consequent power."

The subject is an interesting one to all hydraulic engineers. The system is controlled by the European Co. at 56 Broad St., London, E. C., England, and at the Dexter-Horton Building, Seattle, Wash.

Diamond Drilling at Rossland, B. C.

Diamond drill outfits at Rossland, B. C., are constantly kept at work exposing the deposit. Two sizes of drills are used, one with a bit of 2½ inches outside and 1½ inch inside diameter, and the other with 1½ inch outside and ¾ inch inside diameter. In

starting the drill, especially from those drifts in which tramming is being pursued, a short crosscut is first made by the percussion drills to give a space for the machine and the proper handling of the rods. The rods are square threaded at the ends and come in 5-foot lengths. They are pulled in lengths of 5 to 20 feet, according to the space available behind the drill.

The holes are cored throughout. The core barrel is 5 feet long, and the frequent slips and small seams in the country rock permit the cores procured to be easily broken off by the usual choker device. The average length of the pieces of core is 5 to 8 inches. In careful sampling the core barrel is sometimes pulled out for every 6 inches advanced. The drilling engines are screw fed, and fitted for 300, 700, and 1000 revolutions per inch of advance. Their ordinary speed is 300 revolutions per minute. The water is pumped through the drill rod by a small independent pump run by compressed air. The average progress is 8 feet in an eight-hour shift, with a record of 18 feet 9 inches. The core is broken up and assayed, after a careful examination by the mine superintendent. While drilling in ore, sludge samples are taken by running the discharged water for a fraction of the time into a tin pail, in which the sludge settles out.

The Rossland rock is very hard on diamonds. The War Eagle and Center Star companies employ a skilled bit setter to keep the bits in running order. For the smaller sized bits eight diamonds are used, six on the face and two on the outside. Those on the face are set so that half of them have a cutting edge extending to the outside of the face, while the other half cut the inside clearance for the core to pass up. Whenever the drill is withdrawn from the hole the bit is always carefully examined, and if any of the diamonds are found to be loose or the metal worn away, the metal is recalled around them. When the bit is so badly worn that the diamonds are greatly exposed, they are cut out and reset in a new metal blank.

The wear of carbons is somewhat less than ¼ karat per foot of hole drilled. Each bit will only drill about 12 feet before resetting. To remove a bit that has been broken off in the hole, it is sometimes necessary, if other devices fail, to ream out the whole with a new bit, large enough to enclose the stuck bit and recover it in the core barrel.

United States Mineral Products, 1901.

The United States Geological Survey has issued its annual statistical summary of the mineral products of the United States for the calendar year 1901. It shows for the entire country a total of \$1,092,224,380 as the value of minerals produced in 1901, as against \$1,064,408,321 in 1900. This comprises \$566,351,095 worth of non-metallic mineral products, \$524,873,284 metallic products and \$1,000,000 (estimated) of mineral products unspecified, including building and glass sand, iron ore used as flux in lead smelting, tin ore, nitrate of soda, carbonate of soda, sulphate of soda and alumina clays used by paper manufacturers.

Following is the value of some of the various products: Pig iron, \$292,174,000; silver, \$77,126,382; gold, \$80,218,800; copper, \$86,629,266; lead, \$23,230,200; zinc, \$11,265,760; quicksilver, \$1,382,305; aluminum, \$2,238,000; antimony, \$542,020; bituminous coal, \$236,201,899; Pennsylvania anthracite, \$112,504,045; natural gas, \$27,067,500; petroleum, \$66,417,335; brick clay, \$13,800,000; cement, \$15,788,789; stone, \$55,165,576; grindstones, \$580,730; borax, \$1,102,110; phosphate rocks, \$5,316,403; pyrites, \$1,024,449; salt, \$6,617,449; zinc white, \$3,110,120; asphaltum, \$555,335; clay, all other than brick, \$2,591,332; limestone for iron flux, \$4,665,836; mineral waters, \$7,588,962.

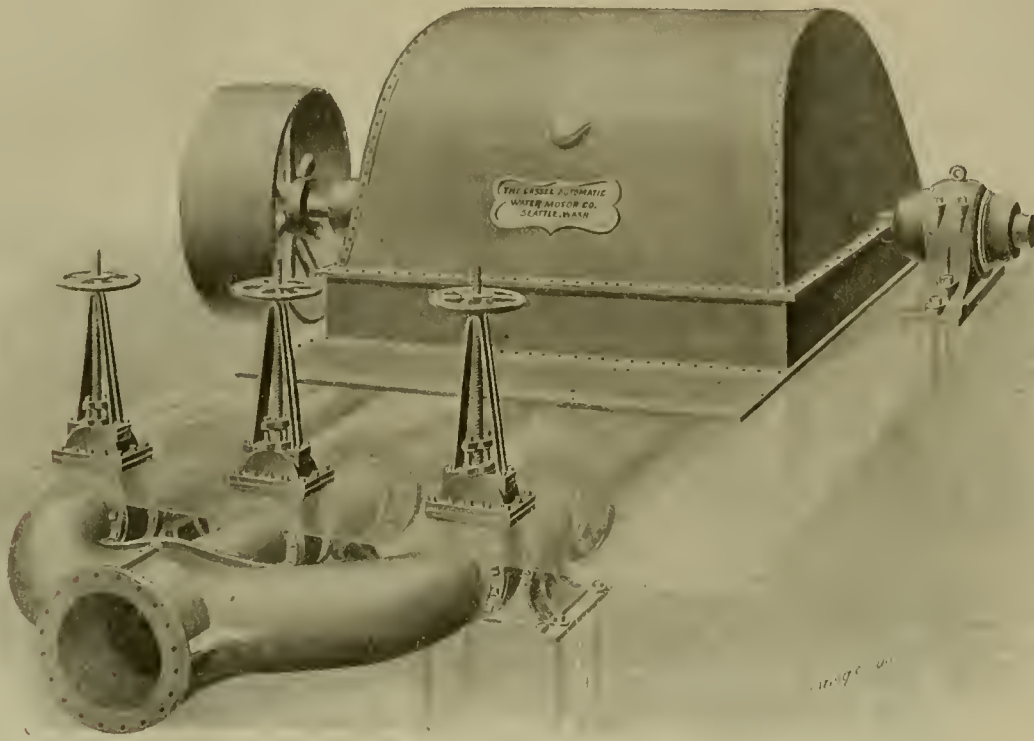


Fig. 1—The Cassel Self-Governing Water Wheels for Large Powers.

method of speed regulation. The governing of the wheel is given prime attention. The manufacturers argue in this way:

"As water is practically non-elastic, water power

pipe line have been slowed down to a rate of flow equal to what will pass through the reduced valve. As a consequence, nearly as much water will pass through the reduced valve temporarily on account of

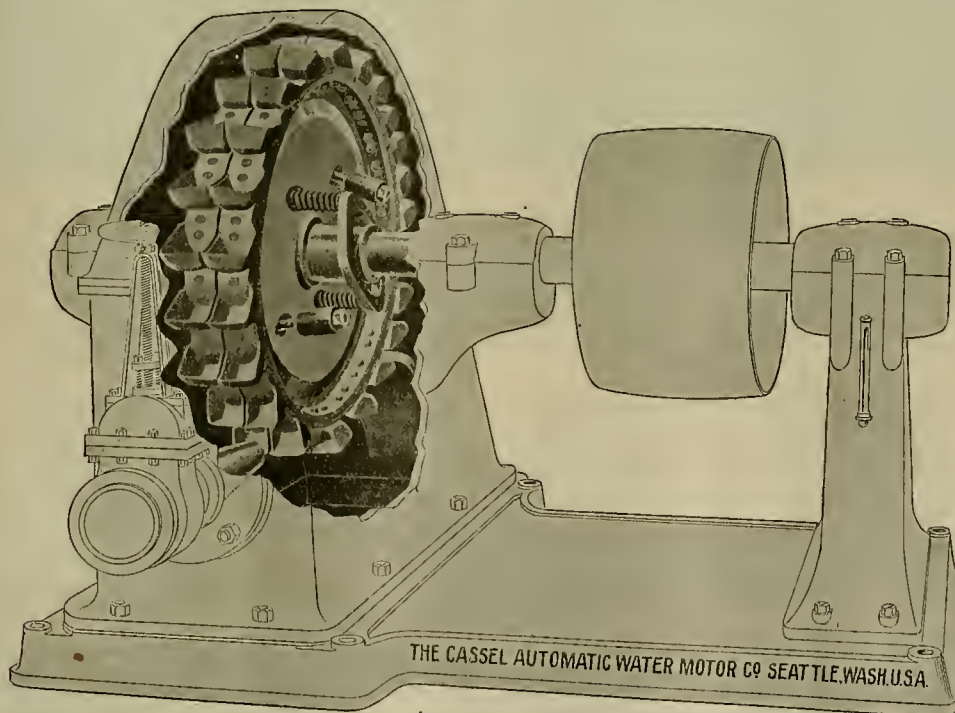


Fig. 2—The Cassel Self-Governing Water Motor—Phantom View.

is the result of the velocity of flowing water. Steam power is the force or energy as a consequence of the compression of steam—a most elastic fluid. The governing of steam engines resolves into the simple principle of controlling the supply of steam to the steam cylinder. The automatic mechanism governing the supply is based upon the principle of centrifugal force. The non-elasticity of water forbids its flow being controlled in the manner of stopping the supply as with steam. And since its power is a di-

rectly the increasing pressure as before, causing at the same time a tremendous strain upon the pipe line. From this it will be seen that, although the water wheel governor may have closed the valve at the proper time, by so doing it has not performed all of the necessary act of governing. The principle employed in the Cassel automatic water wheel is that of centrifugal force as the basis of the automatic mechanism, acting in moving the buckets of the wheel out of the line of impact of the jet or flow of water,

Things to Which Miners Are Liable.

The miner's work is peculiarly dangerous. Neither his surroundings nor his manner of doing his work are conducive to health. This article, however, has nothing to do with the miner's many injuries caused by falling rock and accidental explosions, but more particularly with the pathological changes found in examining men who for years have followed mining continually. We may for convenience divide these diseases into acute and chronic.

Powder smoke headache is the most frequent acute trouble. Where giant powder is used the patient presents all the symptoms of cerebral congestion. The eyes are watery and bloodshot, pupils contracted. The patient has flashes of light before his eyes, intense headache, restless, twitching muscles, frequent nausea and vomiting, possibly due to stimulation of the vomiting center in the medulla oblongata. The face is pale, the pulse rate and wave are both increased. The first few whiffs of powder smoke may make the face congested, but this soon passes away. Every beat of the heart causes a throbbing pain in the head and humming in the ears. Sometimes the patient staggers like a drunken man, and I have known a mine foreman to discharge one of his men whom he saw staggering and reeling on his way to the bunkhouse. Men get accustomed to powder smoke, just as patients get used to taking nitro-glycerine, and the dose must be increased in order to get the desired effect. So in powder smoke, if the miner is in the smoke more than usual he gets the headache, as when he first began mining. Handling giant powder will also cause a headache. It will act as a severe local irritant poison, especially about the eyes, giving rise to severe conjunctivitis and oedema. A combination of acetanilide, citrated caffeine, soda bromide and gelsemium will quickly relieve this distressing headache. I prefer the powdered medicine to the tablets, because of its quicker action.

Sabina is another acute trouble of which I have seen a few cases. All were miners working in a very hot mine; all were new men. The sweat glands seemed to secrete more sweat than the ducts could carry off. Small histers formed, with no inflammation and but little itching. The skin was rough, with a pebble-like feeling. The men changed work, no medicines were given, the blebs dried up and sealed off.

The chronic troubles are more serious. Chronic laryngitis is possibly the most frequent. In my opinion it is largely caused by the peculiar manner of expelling air from the lungs. With nearly every stroke of the hammer the miner expels the air with a rasping noise, which irritates the vocal membranes. Nearly all miners while drilling are mouth breathers. Sometimes the air is cold and dust-laden, which increases the trouble. It will last as long as the cause exists. Medicines are palliative but not curative.

Chronic bronchitis is another frequent trouble of the miner. His work tends to produce it. Where compressed air is used in drilling the air is extremely cold. His habit of mouth breathing, sudden changes from a warm drift to a cold shaft, the sudden falling or rising of blood pressure caused by rapid changes in atmospheric pressure, breathing dust and smoke-laden air, all tend to produce a chronic catarrhal condition of the bronchi, with morning cough and free expectoration of mucous streaked with pus. This condition is not so dangerous in itself, frequently clearing up nicely by simple rest and outdoor life, aided by a little medicine. Yet the man who has an inflamed area in his bronchi is always in danger, because that mucous membrane of lowered vitality is a suitable nidus for tubercle bacilli to lodge and grow. Perhaps this condition can be prevented by teaching the men how to breathe, remembering that God breathed into man's nostrils and not into his mouth.

Miner's consumption is but a step along the same line. I have nothing new to add to this, unless the statement that the lungs take on the color of the material in which the man is working. The lungs of the old coal miner are as black as a lump of coal. The lungs of the hard rock miner are usually grey, especially about the edge, frequently imparting to the touch a gritty, sandy feeling.

I wish to call attention to a peculiar condition of the eyes that I have noticed in old miners and also in blacksmiths, a trembling, twitching, restless, constantly moving condition of the eyeballs, a snappy movement of the eyelids. I have noticed this in hundreds of miners and several blacksmiths. It does not seem to interfere with vision, so far as I know. In the miner I think it is caused by the flickering candle light. In the blacksmith it is possibly caused by the forge fire.

Most of the miners work on Sunday. Men have come to me for treatment who have worked over 1000 shifts without missing a day, sometimes doing over time. These men are simply worn out. Some trifling ailment and the man either dies or is dangerously ill. His vitality exhausted, his surplus energy used up, he has no recuperative power. The Almighty worked six days and rested on the seventh. When He made man He did not endow him with power and

endurance greater than God. The remedy is self-evident.

For some months I have been conducting a series of examinations and urinary tests in order to detect chronic mineral poisoning in miners and smelter men. At present I can only say that I have undoubted evidence of general systematic poisonings by antimony, arsenic, copper and lead. At some future time, when the accumulating evidence is more complete, I will make a report.

In my opinion it is our duty as physicians not only to endeavor to cure our patients, but to prevent their getting sick. Teach them, then, how to live and how to breathe, and much of the sickness is prevented.—Dr. J. W. Coleman in Colonial Medical Journal.

Gold in a New Role.

TO THE EDITOR:—I have made a discovery in the metallurgy of gold which I believe is of importance. The principal feature is shown in an experiment made purposely to give data for this article.

In a conical pit in a piece of charcoal was placed 35 mg. of "exude"; on that 10 mg. of gold; then placed before the blowpipe flame and gradually heated. When the gold softened the exude showed points of white metal; as the gold fused this white metal was absorbed, the gold, apparently, acting both as reducer and flux without slag or residue; the bead thus obtained—purple in color—weighed 45 mg.; after cupelling to a finish—no longer staining the cupel—it was purple in color and weighed 40 mg.; it was then moved to a kaolin cupel, where the cupelling action went on freely, until a bright gold bead was obtained. This gold bead weighed 35 mg., more than three times the weight of the gold added to the exude.

What is this exude? this light weight, greenish-gray colored, pulverulent mass that is reducible to a metal without loss of weight, having no appearance of gold, to which gold acts as both flux and reducer without slag whereby the weight of the gold is increased over three times?

I do not know what it is, and have given it, for the present, the name of "exude," on account of its method of isolation from its origin, which first brought it to my attention some years ago, when, not knowing its auriferous value I threw it away as refuse.

The matter was recently brought to my attention again on the finding of a pocket of gold ore in J. W. Opp's mining property, which joins my gold mining claim. In a specimen of this ore I saw a metal resembling sylvanite; some of the gold had a greenish hue, which I considered indicative of the presence of this exude. An assay in the usual way gave a dark bead; I took this bead, heated it to fusion on a new cupel under the blowpipe flame, and then gradually lowered the heat. At fusion the bead was clean and bright; as it cooled it dulled; a skin formed on the outside, the metal on the inside remaining for some time fluid. At a critical period exuded a pulverulent mass, at first red, then brown, finally when cold a greenish gray. Repeating the fusion and cooling until no more "exude" formed, removing each crop of "exude," there was finally a bead of bright gold obtained. What is this "exude" that appears to come from gold and return to gold?

On charcoal, before the blowpipe flame, the powdered "exude" is reduced to metal without slag; particles in contact at the instant of fusion run together forming a bead; particles not in contact with others form isolated minute beads, and only with much difficulty can they be made to join each other, acting like globules of sickened mercury. A closer examination shows that a skin forms on each bead just after fusion.

These minute beads are brilliantly colored—blue, scarlet, purple and green—purple predominating.

By putting these beads, or the "exude," in a conical pit in charcoal, and beating to fusion and stirring, the "exude" can be brought into one bead of metal, generally violet in color. Scratching the surface shows the metal to be white. This metal I call "exude" for the present, as all of the phenomena above stated can be obtained with it, when all the conditions are right; a slight variation in conditions may result in wide variations in results. There are many variations which would take too much space to describe here, but I am of the opinion that this "exude" is the cause of some of the disputed statements occasionally made about variations in assays, losses on cupels, no gold by one report, good returns by another on the same ore, and there is here, apparently, indicated the possibility of truth in some statements, that by some new process two or three times the quantity of gold is obtained from certain ores than by the usual methods. If an ore contains a large quantity of some form of this "exude" the above experimental results accord with such claims and make them reasonable. I have only met with it in very small quantities so far, but the fact of the existence of a metal associated with gold, having the properties I think I have found this "exude" to have, is important to know, making the examination of some alleged new processes reasonable procedure. Jacksonville, Or.

JOSEPH VOYLE.

Smelting Charges.

TO THE EDITOR:—I have read with much interest, and some astonishment, the articles on "Smelting Charges" in your issues of June 21st and 28th.

I am astonished that any customs smelter should find it necessary to charge its patrons 4½ cents per pound for shipping, converting, refining and selling the copper contained in ore purchased.

Such a proposition shows that this particular smelting company is certainly in business for profit, and if it does not succeed the failure will certainly be due to other causes than a too liberal policy in the purchase of ores.

To show what margin for profit this charge would give to the smelter it is only necessary to state that for years past the smelters at El Paso, Texas, and Silver City, N. M., have contracted with shippers of copper ores to pay for copper concentrates determined by the dry assay, the New York quotations for copper less 2½ cents per pound, and to smelt such ores on a neutral basis for \$4.70 per ton, adding 8 cents per unit for all silica and alumina in excess of iron, lime and copper, and deducting 10 cents per unit for excess of iron over silica and alumina.

The El Paso smelter is still carrying out contracts on above terms. The Silver City smelter is not now in commission, but its closing down was only due to the fact that the enlargement of the El Paso plant made that smelter able to handle all the ores available for both smelters, and to do the work more economically than was possible in the smaller smelter at Silver City. Both smelters being operated by the American Smelting & Refining Co., that corporation very properly closed down the one which was, for the present at least, superfluous.

I make a comparison showing prices that would be paid for the copper concentrates of samples No. 3 and No. 4 mentioned in your issue of June 28th by the El Paso Smelting Co. and the Rocky Mountain Smelter, whose rates you have quoted, as follows, assuming that each sample contains 50% excess of silica.

Sample No 3 at El Paso prices:
Copper 22%—less 1½%—20½%, or 414 pounds copper per ton at 11½ cents, N. Y. quotations, less 2½ cents, 9 cents per pound.....\$37.26
Smelting charges \$4.70 + \$4 for excess silica..... 8.70

Net price realized for copper in one ton ore...\$28.56

Sample No. 3 at Rocky Mountain Smelter prices:
Copper 22%—less 1½%—20½%, or 414 pounds copper at 11½ cents, N. Y. quotations, less 4½ cents, 7 cents per pound.....\$28.98
Smelting charges \$6 + \$5 for silica..... 11.00

Net price realized for copper in one ton of ore...\$17.98

Difference in favor of El Paso per ton of ore.....\$10.58

Sample No. 4 at El Paso rates:
Copper 12%—less 1½%—10½%, or 214 pounds copper at 11½ cents, N. Y. quotations, less 2½ cents, 9 cents per pound.....\$19.26
Smelting charges..... 8.70

Net price realized for copper in one ton of ore...\$10.56

Sample No. 3 at Rocky Mountain Smelter rates:
Copper 12%—less 1½%—10½%, or 214 pounds copper at 11½ cents, N. Y. quotations, less 4½ cents, 7 cents per pound.....\$14.98
Smelting charges per ton..... 11.00

Net price realized per ton of ore.....\$ 3.98

Difference in favor of El Paso \$6.58 per ton of ore.

Comment is unnecessary, unless one should say that "Comparisons are odious."

It cannot be objected that El Paso is more favorably situated for economical smelting. On the contrary all Rocky mountain smelters, which as I take it means all Colorado smelters, are nearer the Eastern seaboard, nearer to coal fields, and have cheaper railroad freights to the East on matte, cheaper machinery and cheaper coke and fuel than El Paso.

The El Paso plant is operated by the American Smelting & Refining Co. and is "in business for profit," and does not fail to make profit all the time.

It is possible that this Rocky mountain smelter desires to discourage the mining for copper, reduce the chances for the profitable opening up of more copper mines, and, as far as can be done by a prohibitive smelting charge, to limit the output of copper in the West.

Or perhaps this smelting company has patterned after the illustrious example of that extraordinary financial prodigy, with whose fame the whole world is just now ringing, and has been so liberal in "commissions" and so altitudinous in its capitalization that extortion becomes a necessity in order to pay dividends on watered stock.

As Mark Twain recently said: "This is the American policy, the policy of give and take, give one and take ten."

C. P. CRAWFORD.

Silver City, N. M., July 31.

Value of Ores in Mexico.

In the United States the value of gold and silver ores is everywhere reckoned in ounces troy of the metal "short ton" (2000 pounds avoirdupois) of the ore. In the case of silver, which fluctuates in market value, the New York quotation on a given day must be known in order to determine the gross value of an ore at that date. In Mexico the assay is reported in kilograms of silver or grams of gold per metric ton (1000 kilograms), being 0.1% and 1 gram of gold per metric ton, 0.0001%. The figure is simple and convenient for both assayer and miner. The Mexican buyer purchases at an unvarying price for silver, payable in silver and at a fixed price for gold, payable in gold if the seller insists, but preferably in silver at the ruling rate of exchange between United States gold coin and Mexican silver coin. The price of silver is \$40.915 per kilogram in Mexican silver dollars. That of gold is \$672.416 per kilogram in gold coin. The mints do not, as a rule, issue gold dollars, as the Government keeps it to pay the interest on the national debt. Almost all bullion containing a considerable percentage of gold is shipped to foreign countries (principally the United States) to be refined.

The Mexican mint receives for refining and coining no bullion which does not at least fine 0.900 in gold and silver. For the fine silver, it pays \$40.915 Mexican per kilogram, less 2% coinage charge and the 3% stamp tax. For assaying each bar, not more than thirty-one kilograms in weight, \$2.50 Mexican is charged, and for separating gold from silver, 0.75 per kilogram of bullion. Gold (if over 3-1000ths is

total, 2.6% on \$40.915, is a direct tax on the silver in the ore of \$1.0638 per kilogram or, 1 kilogram being 31.15 ounces troy, about 3.3 cents per ounce.

If the ore is smelted in Mexico, the smelter pays the tax; if it is exported, it must be accompanied with a consular invoice, and sampled and assayed at the horder for the Mexican Government. In that case the mintage tax, that is, the charge which would have been made if the bullion had been sent to the Mexican mint, is also collected. For bullion, matte or other metallurgical product, the tax of 5% is collected upon the full assay value of the metal contained. For ores it is collected upon 90%, and is therefore 4.5% of the assay value.

Finally, if ore is sold to any purchaser in Mexico, there must be a bill of sale, or factura, on which are revenue stamps to the amount of 3 cents for every \$5 or fraction thereof.

Profits, estimated in Mexican money, from silver ores, if they can be treated locally, at expense chiefly payable in Mexican money, are affected only by the amount of imported supplies required for their treatment. If they go to smelters which make their charges in United States money, the returns will depend on the price of silver and the rate of charge.

As a general conclusion, it may be said that, by reason of the peculiar conditions, the mines of Mexico are less dependent upon the market price of silver than those of the United States.

In Gilpin County, Colorado.

Herewith is a half-tone that has a familiar look to many residents of the "Kingdom of Gilpin." It



Cook Mine and Vicinity, "Bobtail Hill," Gilpin Co., Colo.

present) is paid for at \$672.416 gold per kilogram; but payment is made in silver dollars at about ten points below the current quotation of exchange. Finally, the State tax about to be mentioned is collected upon bullion, unless it has been previously paid on the ore.

Government charges practically unknown in the United States are the taxes on ores of silver or gold, paid both to the Federal and to the State governments throughout the Republic of Mexico. These taxes (being laid upon gross product, without reference to profit) are likely to be so severe that in many parts of the Republic it has been the custom not to insist upon the payment of the full State tax. The Federal tax, however, known as the mintage tax, is collected upon all the gold and silver produced in the country—either at the mints upon the bullion presented for coinage, or at the points of export upon ores or bullion shipped to other countries.

The State "extraction tax" is levied on ounces mined and supposed to be collected before they leave the mine yard on packs. This has been for many evident reasons impracticable and it has come to be the custom to collect the tax as the ores leave the mining camp, or, if they are treated in the camp, as soon as the product is shipped away. The Government may accept the sampling and assays of the owners; or an official may be sent to superintend the sampling, and take a special sample for Government assay. The manifest of the shipper states the number of metric tons shipped and of kilograms of silver per ton. The calculator calculates the silver value of the shipment \$40.915 per kilogram of silver, and collects 2% of that value for the State, and also, according to the Federal statute, 30% of the State tax, or 0.6% of the value, as the Federal tax. The

represents the Americus shaft, the Fisk, the office and shafthouse of the Cook mine and the railroad track meandering "Bobtail Hill."

Substitute for Platinum.

The piece of platinum foil which forms part of the outfit of every beginner in chemistry, and of most working chemists, has become so expensive of late that acceptable substitutes are worth considering. Very pure silver is actually superior to platinum for most of the uses to which such pieces of foil are usually put. It must be very pure; the thick sheets used as anodes by electroplaters are pure enough and of a convenient thickness; or any chemist can easily purify his silver and then get a jeweler to melt and roll it.

When used for evaporating solutions to dryness, the silver is liable to be attacked by oxidizing acids, but this action can be prevented by the addition of ammonia, which is generally unobjectionable. For fusions, however, the silver is altogether preferable. Being unaffected by alkalis, it can be used with caustic soda, instead of the carbonate, and thus a lower temperature suffices; manganese and chromium fusions are readily performed. The silver is so cheap—a piece an inch square and a sixteenth thick should cost about 20 cents—that thicker, and, hence, stronger and more durable pieces can be used; with such heavy pieces a strip an eighth of an inch wide may be cut so as to project as a handle, and the assay is thus freed from liability of contamination by material from the tweezers which hold the foil in the flame—generally a great nuisance with platinum.

The platinum wires, also, which are used to hold

salts in a flame for spectroscopy work, may be replaced by iron, with advantage, for the iron may readily be thrown away if they get mixed or incrustated. —W. P. White, University of Wisconsin.

Power Drills.

The power drill consists of the following parts: Cylinder, piston, rotating mechanism, and valve. These constitute the working parts of the drill, and are mounted in a frame or shell, provided with means for feeding it ahead as the drilling progresses.

For work on the surface, the drill is usually supported on a tripod, which is placed over the spot where the hole is to be drilled, and when the desired depth is reached the whole apparatus is moved to the next place, usually a few feet distant. For underground work, such as shaft sinking or drifting, a column or har is used, as several holes can be drilled from the same position of the har, and a tripod is difficult to handle underground where the room is confined. The drill is fastened to the mounting or support in such a way that nearly all the space can be reached and the holes drilled in any desired direction.

In the end of the piston that extends outside the cylinder provision is made for fastening a drill steel or bit, which must be changed for an average size drill, say every 2 feet in depth, which is the extent of the feed, or oftener, according to the time it takes to wear off the cutting edges on the drill steel.

The work of a power drill consists in the piston travelling forward and backward in the cylinder, actuated by the pressure from steam or air, according to what is available. The number of double strokes or blows will vary between 250 to 500 per minute. The forward stroke against the rack is uncushioned, that is, the drill steel fastened in the piston must take the full force of the blow, but the force of the backward stroke is taken up in a cushion by admitting the pressure into the back end of the cylinder before the backward stroke is completed. The work of the piston is controlled by the valve mechanism, which alternately admits the pressure at the top and exhausts it at the bottom.

In this valve mechanism, or the means for controlling the forward and backward strokes of the piston, is the greatest difference in the various types of power drills.

An important feature of the power drills is the rotating of the piston during the work. If the position of the drill steel remained the same during a number of blows, the consequence would be that the steel would wedge fast in a very short time, the hole would not be round but the shape of the bit, and power wasted. It is therefore necessary to rotate the bit a small part of the circle between each blow. This is accomplished by horing out the hack end of the piston to give room for a rifle har, which is part of the rotating mechanism. The usual thing is to place a ratchet ring in the hack end of the cylinder, supported between washers, the one on the inside having a hole in the center for the rifle bar to pass through. In the inside circumference of this ratchet ring are a number of teeth or ratchets. The head of the rifle bar contains two or more pawls that will engage the teeth or ratchet in the ring, when the rifle bar is turned in one direction. Each rifle on the bar is a screw-thread that will make a revolution in about 60" and

the har contains, usually, five or more rifles. In the end of the piston is placed a nut that fits the rifles in the har. This mechanism is so arranged that on the forward stroke the pawls will pass over the ratchets, and allow the rifle har to turn, but on the backward stroke the pawls will hold the rifle bar fast and the piston will turn a small part of a circle. As the stroke of an average size drill is about 6½", the piston will describe a revolution in about nine strokes, so that the force of the blow is fairly well distributed over the bottom of the hole.

The amount of work done by a power drill is usually measured in lineal feet of hole drilled in a given time. This again depends on the kind of rock, the depth to which the holes are drilled, troubles that may be caused from seamy rock, when it is difficult to keep the hole straight, and the drill runner. Comparison is, therefore, difficult if not impossible. In some cases 20 lineal feet drilled in eight hours would be considered good work, in other cases from three to four times this amount would only be considered fair.

The drill runner is a very important factor in the amount of work that can be done with a power drill, for experience counts here as well as in most other things, but, as stated, the condition of the rock and work has a large influence. From twenty to eighty lineal feet may be drilled in a day. Sometimes this is exceeded, as proved by one instance where one man and a helper drilled 218 feet in a little over nine hours. This was done with a 3½-inch drill mounted on tripod and in an open cut.

THE experiment of the Edison Co. upon the black sands of New Mexico in the effort to save the gold therein contained by the application of electricity is reported temporarily abandoned.

Restraining Barriers in Yuba River, Cal.

In 1893 California appropriated \$250,000 to build restraining barriers against further advancement of debris in the Sacramento valley, contingent upon the Federal appropriation of a like amount. This was secured in 1896. In 1901 a further joint appropriation of \$300,000 was secured, thus making \$800,000 available for the work. The whole thing is under the direction of the members of the U. S. engineer corps that constitute the California Debris Commission.

Since the first half-million-dollar appropriation was made, there has been considerable preliminary prospecting, calculating, selecting, boring and estimating. The Commission reached the conclusion that a site locally known as the Narrows, in the vicinity of Smartsville, Yuba county, Cal., would be a suitable one for the proposed work; an extended series of investigations and surveys were then made under the direction of Assistant Engineer Hubert Vischer, determining the depth of the tailings in the bed of the river, the configuration and character of the bed-rock, and, in general, all the existing conditions. The engravings, Figs. 1, 2 and 3, show the nature of the work. Fig. 3 shows a special device made for that work; in boring there-with pebbles 3 inches in circumference were brought up from a depth of 80 feet by the suction process of the boring machine. The test borings showed a depth of from 50 to 85 feet of gravel.

This preliminary work was completed in September, 1898, and about that time it became the settled opinion of the engineers that a further and larger project on much more extensive lines would be required to make the matter have the largest measure of ultimate success. In the work of securing appropriations, etc., the California State Miners' Association was an active factor, and when the decision of the engineers was made regarding the extension of the original plan that organization gave material aid. Obstacles of various kinds arose. The gentlemen comprising the California Debris Commission have more than enough to do, with river and harbor work entirely outside of their additional duties as members of that Commission, and those duties so delegated to them are just that much additional work imposed upon them by the Federal Government without additional pay. Despite this, the members of the Commission have pushed ahead as fast as circumstances would allow, and while the nine years' delay has been exceedingly vexatious, it is not easy to see where the California Debris Commission could have ex-

pedited matters. During the last year much of the delay has been due to the difficulty in securing satisfactory title to the 2000 acres that the Commission decided was necessary. At the 1901 meeting of the California Miners' Association some prompt and characteristic action accelerated progress, and matters have now so far progressed as to make it possible that the actual work so long delayed may be begun this year.

The California Debris Commission thinks that the actual work may be started Oct. 15. Specifications have been forwarded to Washington for the construction of the first of the series of dams to be made, the cost of which will be \$35,000, this to be situated at a point about midway between Brown's Valley and Smartsville, 16 miles east from Marysville. Other dams will be constructed from time to time as the Government deems best. The appropriations, aggregating \$800,000, are expected to provide for the storage of mining debris within the bed of the Yuba river by a system of works designed to separate the coarse material from the fine, and also to provide for narrower and well defined limits in order to preserve in place the extensive deposits in the river below. The scheme, as reported by Hubert Vischer, is to erect several barriers across the river bed, the upper ones to be located about 3 miles east from the mouth of Dry creek; another to be located just below the mouth of Dry creek as a flood overflow barrier; another to be placed at Daguerre Point; also to form a settling basin about 3 miles in length and half a mile in width on the south side of the river. This settling basin will consist of a levee, protected from the wash, to be built in the bed of the river, with its upper and lower ends connecting with the existing levee and shore on the south bank. The end walls are to have inlet and outlet weirs and conduits to regulate the inflow and outflow of the river and to cause the finer material carried in suspension to be deposited and held in the settling basin, through which, at all but flood stages, the river will be compelled to flow. Below the settling basin the river will be confined within well defined lines by necessary training works. The Yuba river was selected as the starting place for the work for the reason that a much larger share of detritus from the mines had been carried down that stream than all the other tributaries of the Sacramento river.

To give a general idea of the project is here presented an illustration of the proposed "Barrier No. 1," from the official drawings and accepted plan as approved by the chief of engineers U. S. army.

The upper barrier will have a height of 40 feet above the present bed, and will extend entirely across the river. Its crest length will be 1000 feet. This barrier is to consist of gravel, cobbles, brush, rock paving and some masonry



Fig. 1—River Bed and Embankment 300 Feet High, Site of Restraining Barrier, Yuba River, Cal.



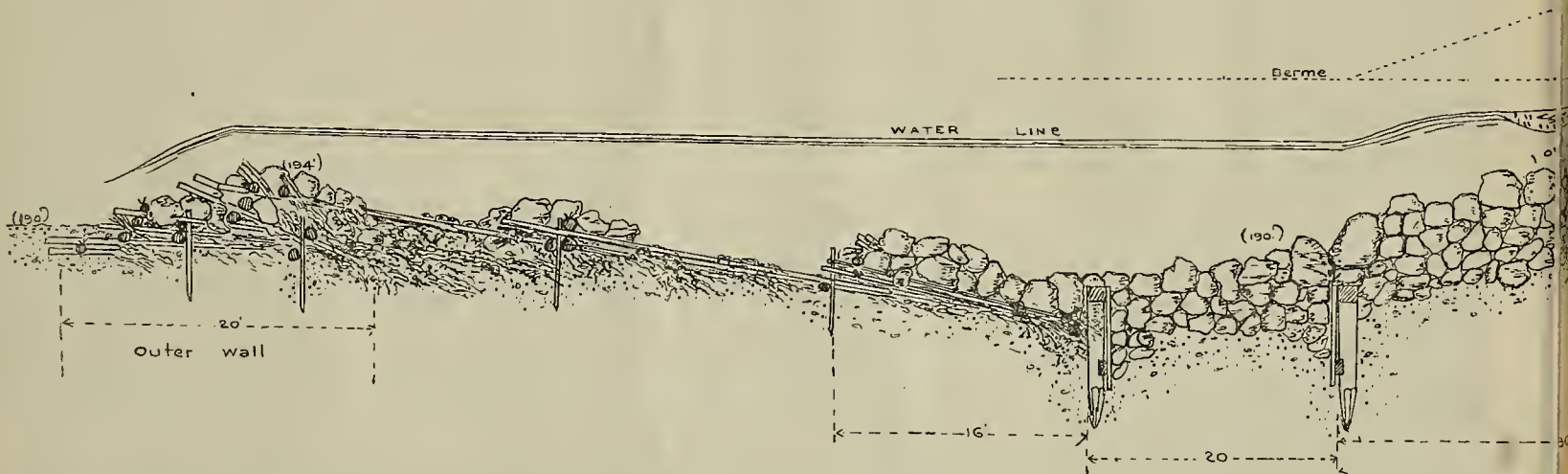
Fig. 2.—The Narrows, Yuba River, Cal., Where Assistant Engineer Vischer Took Soundings.

in its lower slope; a masonry crest, and a double row of sheet piling in its toe. It is to be built up gradually, the river flowing over it, and its chief function will be to impound coarse material behind it and form a new grade for the tailings, extending up to and beyond the Narrows.

Barrier No. 1 (see engraving) is to be located about $\frac{1}{2}$ mile below barrier No. 2. Its general construction resembles that proposed for No. 2, its height to be 18 to 26 feet above the tailings now in the river, the crest length proposed to be 1100 feet. At its northerly end a by-pass, with a weir 600 feet in length, which in extreme flood stages (assumed at 125,000 cubic feet per second) would permit a flow over the lip of the weir 7 feet in depth, with a flow over the dam estimated at $3\frac{1}{2}$ feet. Barrier No. 1 makes a water cushion for barrier No. 2. At all but flood stages of the river the flow will be through the by-pass or

weir. Both barriers together may raise the plane of river deposits about 40 feet, and are estimated to store, on an assumed gradient of 15 feet per mile, a volume representing 36,000,000 cubic yards of coarse material, at a cost of about $\frac{1}{10}$ cent per cubic yard.

The next structure, a flood overflow barrier, is to be located $\frac{1}{2}$ mile below Dry creek, a composite structure, consisting of some crib work, with rock filling and paving, and some sheet piling. It is a low structure, 4000 feet in length. During floods it will be submerged; at other stages of the river it will direct all the water into or through the settling basin. The next barrier is to abut against Daguerre Point, extending south to the levee or embankment of the settling basin. Its crest length will be 3000 feet and its general height 14 feet. A cut is made through Daguerre Point to rectify the flow and to share with the northerly half of the



SECTION DRAWN TO SCALE (FROM OFFICIAL MAP), OF PROPOSED BAR



Fig. 3.—Apparatus Used in Making Soundings by Boring and Suction Progress, The Narrows, Yuba River, Cal.

harrier the duty of passing the flood waters. This barrier is to be essentially a brush and gravel structure, heavily protected with rock. The flood overflow harrier directs the ordinary flow of the river into the settling basin through inlets in the embankment forming the upper end of the basin. The hasin, as designed, is capable of holding about 14,000,000 cubic yards of fine sediment, and by extending it farther to the westward it can be enlarged to a capacity of at least 50,000,000 cubic yards additional. The project, as here outlined, is estimated to cost about \$780,000, exclusive of the land required (about \$20,000 more).

The project as submitted is novel, since nothing of the kind, so far as known, has ever been attempted, and it is to a certain extent experimental. The various structures are simple and are believed to be safe, practicable, and

reasonably permanent. They can be repaired if required, and if abandoned, not maintained, or never completed, cannot leave the river in any worse shape than at present. If constructed, it is believed that they are capable of storing the debris now in the Yuha river and its tributaries, which is far in excess of that in all the other tributaries of the Sacramento river. The result of the storage cannot be otherwise than beneficial to the navigation and commercial interests of the Sacramento and Feather rivers. The Commission say: "Especial attention is invited to the fact that the object sought to be accomplished is the storage of the detritus now in the Yuha and its trihu-

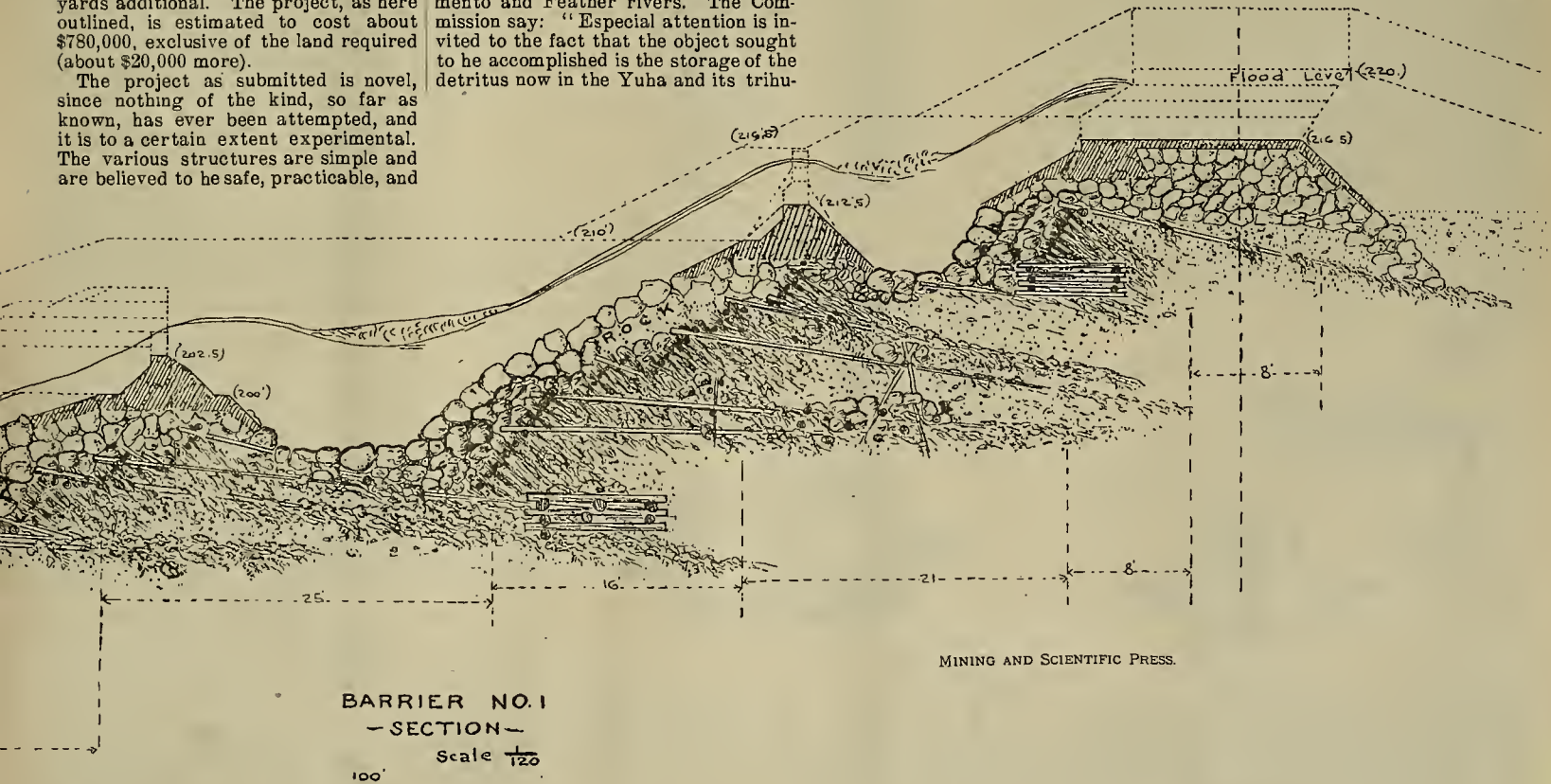
taries, with a view to the improvement of the rivers below, and decidedly not with a view of permitting unlicensed or indiscriminate hydraulic mining at localities above the impounding works. When the works have been completed and in operation for several years there will be time and opportunity to determine whether or not the system is capable of sufficient expansion to warrant an attempt at storing therein the tailings from the hydraulic mines without compelling each mine to impound any or all of its debris."

In the concluding part of his report Mr. Vischer says: "Only a general scheme of operations can be mapped out for such work in advance, a detailed estimate being, of course, out of the question. The work would resolve itself into a multitude of small works, some of them too trifling to require any plans, and would be of the character best covered by the daily labor of an intelligently directed work force, but not necessarily one kept always organized. The operations would consist in clearing lines of brush to facilitate flow, in blocking side channels gradually to obstruct it, in building brush work for spurs to direct current, or for silt arresters to build up land, the work wherever possible to be disposed at the training walls or near by, but not following any prescribed line. The lines of training wall, so called, would actually be property lines, inside of which liberty should exist to conduct work with perfect freedom. There might be some dredging or snagging to remove obstacles in the path of flow, but seeing that the drainage from the settling hasin is intended to follow a southerly route, operations during the dry season of the year would not be interfered with by water. The outcome, perhaps attainable at the end of several years, would be a well-defined river channel of good capacity, bordered by lands which would overflow and form part of the river during flood, and hack of these there would be private lands in process of reclamation, but perhaps still subject to periodical inundation. In brief, the idea is to cause the river to make deposits where desirable, but otherwise to prevent them. Such work is very desirable and should not be needlessly deferred, and it is therefore suggested that an item to cover the cost—for instance, \$50,000—should be added to the estimate for improving Yuba river.

"We have an estimate of the amount

of deposit from the Narrows to the State dam during nineteen years, 33,637,000 cubic yards, but no figures obtained by direct observation for the deposit upon the whole river area for any period at all. But it will hardly be questioned that the deposit over the upper portion of the river must have been relatively less during the last six years than it was for the earlier thirteen. The last six years have been relatively dry years, without notable freshets. Hydraulic mining has been under control since 1893, whereas the first thirteen years cover at least five years when hydraulic mining was at its highest activity. Finally, the sweeping of the upper canyons was pretty well accomplished prior to 1893, as there are reports from actual examination to prove. It would, therefore, appear that we are safely within the facts if we take the sum of the two averages and accept it as an expression of the annual rate of accumulation since 1893. The first average is 1,770,000 cubic yards, in round numbers; the second, 2,373,000, and the sum of both, 4,143,000 cubic yards. This figure may be used as an indicator of the length of time that the storage provided under the project of 1899 would last if there should be no increase of the annual requirement, and under present conditions this requirement should be a decreasing quantity.

"Comparing the foregoing figures with the storage estimates for the higher levels of the Narrows dam, the showing is favorable to the project of 1899, considering only the totals and rates, quite independent of the security afforded by the two systems. The 1899 project possesses superiority also in that it provides for future requirements if need should arise, while the Narrows dam gave no such outlook. Should harriers 1 and 2 be built and meet expectations, additional harriers can be built as required, each being a practical repetition of harrier No. 2, which may serve as a type for all of them. The estimates for the 1899 project are sufficient to cover the storage requirements for several years—perhaps ten, perhaps more. Having indicated the practical identity of the methods proposed for storing coarse material, the estimate made in former years may be accepted as safe figures for the costs as well as for the amounts of additional storage, with the understanding that the figures refer to coarse detritus."



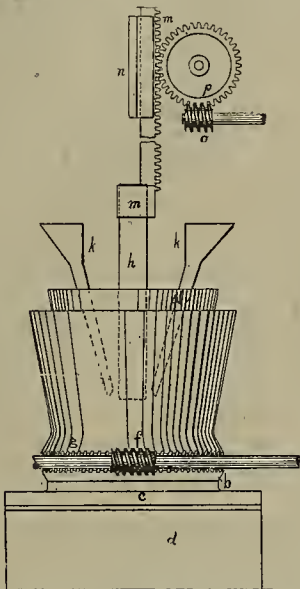
I, FOR THE STORING OF DEBRIS, THE NARROWS, YUBA RIVER, CAL.

Mining and Metallurgical Patents.

Patents Issued August 5, 1902.

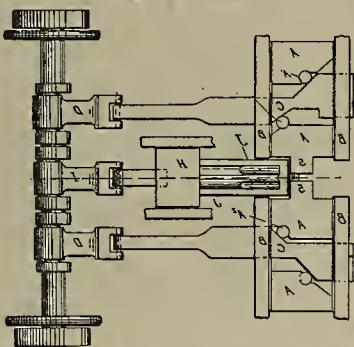
Specially Reported and Illustrated for the MINING AND SCIENTIFIC PRESS.

ELECTRIC FURNACE.—No. 706,099; A. Parker, Chorley, England.



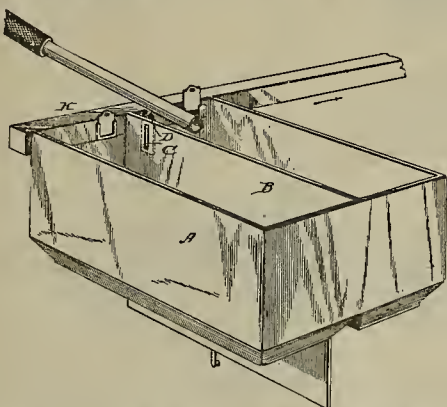
Electric furnace combination with crucible a, positive carbon electrode h placed diametrically across crucible, rotatable supporting platform h, recessed base e, supporting plate c in two parts with recess into which platform base fits, worm wheel g around its periphery, worm f gearing with wheel g, chutes k to deliver material direct into arc, mechanism for raising carbon electrode h as crucible fills.

MEANS FOR SHAPING AND SHARPENING DRILL BITS.—No. 706,135; J. Wagner, Denver, Colo.



Means for shaping and sharpening bits for machine rock drills, combination with two co-operating die blocks, each having wedge-shaped recess, two other recesses each forming half wedge-shaped recess, each die block having hinged member on one side of wedge-shaped recess, suitable frame on which one die block is movably mounted, means for hinging faces of die blocks together, whereby bar from which drill bit is to be formed is securely held in place, means for holding hinged members of die blocks closed, means engaging one end of drill bit bar, for shaping bar to conform to wedge-shaped recesses of die blocks, means for releasing hinged members of die blocks, whereby they are allowed to open as die blocks are separated.

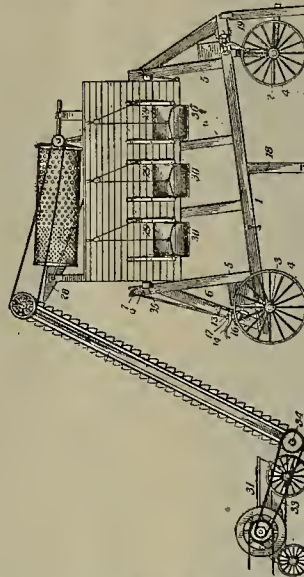
ORE SEPARATING APPARATUS.—No. 706,163; B. C. Cook, Deadwood, S. D.



Apparatus for separating ores comprising box or receptacle with longitudinal partition wall therein, lower portion of each compartment thus formed hopper-shaped, adjacent inclined walls diverging from and joined to partition, bottoms hinged to longitudinal edges of hopper-shaped portions, valved outlet from one compartment to other at top, feed pipe dis-

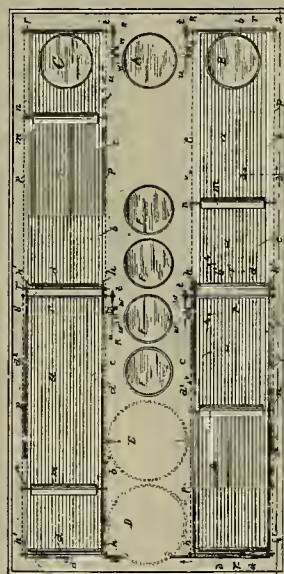
posed longitudinally of box, supported thereon at one end to deliver incoming material in direction reverse to outflow of material from box, flexible connection with pipe beyond its point of support whereby pipe may be swung laterally while supported on end of box, having overflow discharge passage at end over which material is fed, feed and overflow being opposite in direction.

STONE HANDLING APPARATUS.—No. 706,197; C. N. Owen, Mechanicsburg, Pa.



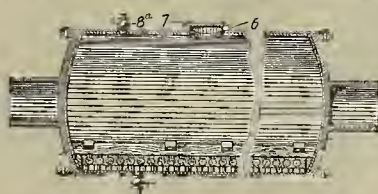
Stone handling apparatus comprising carrying truck, portable stone bin thereon, means for raising and lowering bin, screen mounted at top of bin adjustable therewith to receive stone from elevator and direct same into bin, stone crusher to which elevator is connected upon which it is adjustable.

MEANS FOR EXTRACTING PRECIOUS METALS FROM ORES.—No. 706,302; L. B. Darling, Providence, R. I.



In gold extracting plant, combination of grooved treating floor a, adapted to receive thereon comparatively thin layer of finely divided ore and treating solution constituting pulp, mechanically actuated rolling device arranged to be continuously propelled forth and back to agitate pulp or material lying on floor, suitable launders or ducts communicating with grooved portion of floor, and sump tanks into which metal charged solution is discharged from launders.

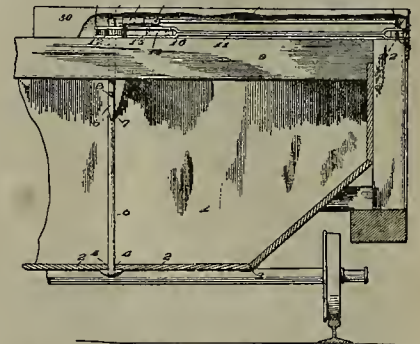
FILTER BED FOR CHLORINATION BARRELS.—No. 706,472; A. E. Johnson, Colorado Springs, Colo.



Combination with tank or harrel of class described, of filter located therein comprising grooved bars arranged side by side so that grooves in adjacent side of any two bars register, filtering material placed in spaces between bars, openings being left at top and bottom to allow solution to pass through filter, filter bars provided with lugs to support filter, corners of bars cut away at their ends forming openings for insertion of filtering material, hindering strips

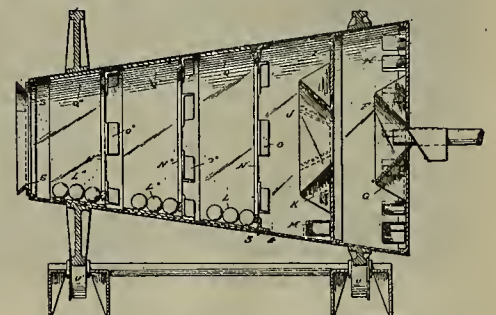
covering end openings secured to tank to hold filter in place.

DEVICE FOR SECURING OR RELEASING TRAP FLOORS FOR ORE CARS.—No. 706,312; J. J. Galway, Duluth, Minn.



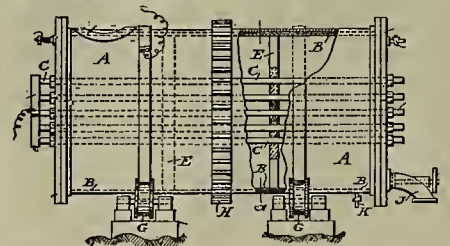
In mechanism of class described combination with suitable car having trap doors, of rod supporting same in such manner as to effect their release upon rotation, means for locking rod against rotation, lever for rotating rod having its outer end bifurcated, swivel block pivotally mounted between arms of bifurcation, and rod engaging swivel block provided with means engaging locking means for manipulating parts.

APPARATUS FOR LEACHING ORES.—No. 706,334; G. Moore, Salt Lake City, Utah.



Apparatus for leaching, comprising shell or body in form of truncated cone, head at each end having central opening, opening of small head being larger than that of large head, adapted to receive material to be operated upon, means for admitting fluid solvent through opening in large head, and discharging it through opening in small head, and means for actuating material through body and discharging through opening of large head.

APPARATUS FOR ELECTROLYTICAL TREATMENT OF ORES OR SLIMES.—No. 706,436; F. T. Mumford, Kalgoolie, Western Australia.



Apparatus for extraction of metals from their ores and slimes, comprising metallic drum, copper lining therein, means to maintain lining continually amalgamated, trailing electrical contact for drum, plurality of conductive bars passing longitudinally through drum and insulated therefrom, and means to rotate drum.

TREATMENT OF GOLD AND SILVER ORES.—No. 706,365; S. Trivick, Clapham Common, England.

Process for evolving nascent chlorine and effecting chlorination of metals, in order that they may be extracted from metalliferous mass by rendering them solvent, consisting in adding to mass mixture in definite proportions of two dilute solutions, one being solution of calcium hypochlorite free from calcium hydrate, other solution of ferric chloride, proportions being such as to result in formation of ferric hypochlorite, leaving some excess of ferric chloride, which will evolve nascent chlorine.

DESULPHURIZING SULPHIDE ORES PREPARATORY TO SMELTING.—No. 705,904; A. D. Carmichael, Broken Hill, New South Wales.

Process of treating mixed sulphide ores, consists in mixing with ores sulphur compound of metal of alkaline earths, starting reaction by heating same, thereby oxidizing sulphide, reducing sulphur compound of alkali metal, passing current of air to oxidize reduced sulphur compound of metal of alkalies preparatory to acting upon new charge of sulphide ores.

Mining Summary.

Specially compiled and reported for the
MINING AND SCIENTIFIC PRESS.

ALASKA.

Recent arrivals from Nome say that while the beaches are worked out, as far as rocking is concerned, new and improved machinery is being installed which will save a large part of the gold lost in the primitive rockers. The district is more and more taking on an air of permanency, and good strikes are being made. The creeks are being worked in a systematic manner, supplies are cheap, and, altogether, affairs at Nome, though they have not the boom air of a few years ago, are in a healthy condition. Nome City is now incorporated. There are around and about Nome City, including the population of that city and those who make it their headquarters, about 20,000 people. Work is plentiful and men are in demand. Wages are not as high as they were, but supplies are cheap and labor conditions are in better shape than before.

Pay dirt is being found in quantities on Otter, Dexter and Ophir creeks. The bench lands are also being worked profitably. The recent excitement has been at Candle creek, where considerable amount of gold was said to have been discovered. One claim on Otter creek is paying about \$8 a day to the man. The dirt is easily handled. In winter time it is thawed and banked up, and when the water begins to run, about the first of July, it is sluiced and bedrock cleaned. The bedrock lies about 20 feet below the surface, and there, of course, the best values are to be found. A system of drainage is necessary, for if the dirt sluiced is damp some of the gold is apt to be lost. Altogether mining in Nome has to be conducted on scientific principles, and the gold obtained is not gotten through mere luck.

The gold in the district lies in pockets, and is very uncertain. Pay dirt plays out at unexpected intervals, and is found where not expected. Two men made a strike directly on the top of one of the foothills that was one of the best paying propositions discovered in the camp. Pocket hunters are coming into the country and are making good finds. The quartz sources of the placer gold have not been discovered. The mountains have been but little prospected and an undeveloped field awaits the quartz miner.

The Anglo-Alaskan Construction Co. has incorporated in New Jersey to manage construction work of the Valdes, Copper River and Yukon Railway, which Helm & Abbot of New York and their English associates propose to build from Valdes to Eagle. F. C. Helm of New York, manager construction company, says that 30 miles of track, for which the rails are now en route to Valdes, will be laid before the end of December. He hopes to have the entire road completed through to Eagle City in two and a half years. The road will follow the Government trail for 100 miles from Valdes, thence crossing the Copper river, and taking an almost direct route through to Eagle.

Over 1200 quartz locations have been recorded at Dawson. During July 140 claims were renewed, development work being done on every one. The minimum amount of work allowed is \$100 worth. On many claims work was done running from \$300 to \$1500. More quartz claims have been surveyed during the last two months than ever before; the Government fee for surveying is \$250.

Valdes reports that D. J. Reynolds, a New York banker, and other New Yorkers have lost \$50,000 by the failure of mines on Cook inlet to produce gold as expected. Reynolds was the principal stockholder. He went to Cook inlet last month and returned to Valdes, accompanied by a mine expert who had gone north several weeks earlier to examine the property. The latter pronounces the mines of no value whatever and is quoted in an interview at Valdes as declaring that the project was a swindle. The mines were owned by a company which had some quartz claims on which considerable surface work had been done. Samples of some ore supposed to be taken from this property were sent to New York, assays proving them of high grade. The stockholders were apparently led to believe they had a bonanza. The promoters have left and the machinery lies idle.

The Rodman Bay Co. will put in a 60-stamp mill next season.

ARIZONA.

COCHISE COUNTY.

The Casey group of gold mines, near Wilcox, has been bonded by Eastern men. Manager Brockman of the Pearce mine is

pushing development work on the group. Adjoining the Casey mines is the property of the Mortar M. Co.—six claims—on which work will begin next month. The company has located four claims adjoining the Lucky Friday.—An 18-inch ledge of ore is struck at the bottom of the shaft of the San Juan property.—Another shoot of ore has been struck at the Banner, on Florida mountain.—The Adde mill is completed. The Swan Falls plant will furnish electric power to run the mill.

The Peabody, at Johnson, has resumed operations and will increase their force as soon as more miners can be had.

The Copper Bullion M. Co., at South Pass, is about to ship ore; a new working shaft will be sunk. Superintendent McManus has the main tunnel in 1000 feet; about 3000 feet of work has been done.

MARICOPA COUNTY.

Someone has said that anyone who has ever drank of the waters of the Hassayampa will ever have subsequent difficulty with the undiluted truth. From the Hassayampa, in the vicinity of Walnut Dam, now comes the statement "that between the dam site and the box canyon below lie 20 miles of river bed, ranging from 50 to 300 yards in width and teeming with gold; on top of the gold and bedrock is from 40 to 160 feet of sand, gravel and immense boulders. At the box canyon two large mountains come nearly together and the bedrock comes close to the surface, forming a cyanide tank 20 miles long and 100 feet deep. Nature has not only provided the tank, but has placed the gold therein and supplied the water, as well, and it now awaits the man who will add the cyanide."

MOHAVE COUNTY.

O. Ellis at White Hills has a lease on 250,000 tons of tailings and will erect a 50-ton cyanide plant.

SANTA CRUZ COUNTY.

The Buena Vista M. Co. are planning a reduction plant, daily capacity 300 tons of ore, on the Santa Cruz river, east of Nogales.

YAVAPAI COUNTY.

The Float Rock G. M. Co. will start work on its property, 1 mile from McCabe.—The Empire mine expects to have 100 men at work by October 1.

The Federal M. & M. Co., Cherry Creek, has a ledge which averages \$30 and expects to have a mill in operation by the first of the year.

The Iowa M. & D. Co. will survey its claims for patenting. The property of this company lies between the Monarch and the Federal, and it may spend \$50,000 developing it and erecting a mill.

Men from the United Verde, Jerome, tell the Phoenix Republican that both the mine and smelter are practically closed down and 500 men are out of employment. Few are retained except the machinists and those who could assist in the efforts being made to stop the fire in the mine.

There is plenty of ore on the two lower levels to keep the smelter running, and it is available through the new shaft; but, since the fire broke out, a shaft in the big engine room was broken, and it was thought better to close the smelter temporarily for repairs. It is believed now that the fire has spread as deep as the fifth level, and the old shaft is impenetrable for gas. The openings from the new shaft to the upper levels are bulkheaded, so the gas cannot escape into the new shaft. It is said that in one little stove a fire has been burning for years, and from the vast amount of sulphur in the ores it is hard to predict the result of the present fire. While no one knows how it originated, it is the theory of some that a miner left a candle burning, from which a timber was fired, and from that the combustion of the ores was started. The ground over the burning region is considered unsafe. While it delays operations at the mine and stops the output, it cannot burn up the copper; and though it is a matter of loss to the company, they probably will not feel it as much as the hundreds of men thrown out of employment. W. A. Clark is there to confer with the mine management over the situation, and see what course is best to pursue in an effort to stop the fire. The employees of the company did all they could to help so long as their services were desired, and many took chances on their lives in trying to approach the fire, the gas turning them back.

The Congress G. Co. will put in a new pumping plant to take the place of the one destroyed by the dynamite explosion last week.

Superintendent W. J. Martin of the Monarch M. Co. is working the old Mocking Bird group, Cherry creek district, sinking a 500-foot shaft on a ledge 8 feet wide between walls. About 40% of the ore is free milling. Some of the ore assays \$40.

Manager J. H. Canavan of the Big Bug G. & C. M. Co., on the property about 2 miles east of Mayer, has a double-com-

partment shaft down 200 feet. It is his intention to push it to a depth of 300 feet. He has been pumping 40,000 gallons of water per day from the mine. He has the mine equipped with a 5 H. P. gasoline hoist and a 12 H. P. gasoline engine to run the blower, pump and electric drills.

CALIFORNIA.

AMADOR COUNTY.

Near Pine Grove, the new 10-stamp mill at the Defender is nearing completion.—Twenty stamps will be running this week at the Mitchell mine. The buildings will be electrically lighted.—Superintendent Platts of the Mountain Queen, formerly Anaconda, has started a 200-foot tunnel to tap the old shaft.—The Edinburg G. M. Co. are surveying to determine where to sink a shaft and erect a mill.—The east level in the Amador-Phoenix mine has reached the Roger & Bowden shoot.

The Sutter Creek Record says that sinking is to be resumed at the Gwin mine. The present depth is 1840 feet. The 80-stamp mill is in regular operation.—The Onelda mill is running forty stamps. Sinking will be resumed from the 2000 level. The last clean-up of the mill netted \$8000 after paying running expenses.—The Record hears that the North Star and South Keystone quartz mines will begin operations as soon as the title to the former property can be adjusted.—At the Wildman mine a new level is being opened up at the 1400; ore developments flattering. About seventy-five men are employed and thirty stamps of the mill are crushing with satisfactory results.

The Jackson Ledger reports operations at the Argonaut at a standstill.—The Horn mine has found the ledge.—At the Mitchell ten stamps are at work. The other ten stamps start next week.—At the Sargent a set of timbers is being put in every fourth shift, which would give the contractors about \$4 per day per man.—At the Bunker Hill \$135,000 has been spent in the purchase of the property and development work.—The Bay State is working the 10-stamp mill on ore from the 850 level.

N. R. Ellis, local manager of the Standard Electric Co., tells the Jackson Dispatch that the company will build the Deer valley dam, 8 miles below lower Blue Lakes, at once. The dam will be 100 feet high, 725 feet in width on the crest. It will impound 2,750,000,000 gallons of water and provide storage facilities to run five machines.

The Shenandoah at Plymouth has completed its crosscut to the ledge at the 750-foot level.

At the Hercules mine Shields & Noe are building a 5-stamp mill.

Dr. Boyson of Sutter Creek has men clearing out the old shaft on the Butler property.

The Bay State mine, north of Plymouth, shows fine prospects at the 800-foot level.

BUTTE COUNTY.

Effort is being made to mine the gravels which lie beneath the town of Oroville. O. Enslow is sinking a 4x6 shaft to mine the gravel. He expects to reach bedrock at 30 feet. The water is handled by a centrifugal pump. The shaft is near the point where years ago an effort was made to work by pneumatic tubes, into which air was pumped under the theory that the pressure would hold back the flow of water. The scheme failed, as did many others which had for their object the mining of the rich strata.

CALAVERAS COUNTY.

Mokelumne Hill reports an old-fashioned placer at Lancelle gravel mine, operated by P. L. Shuman. In a run of eighty hours 361½ ounces of gold were cleaned up; mint value of that gold being \$18 41 makes \$6646 01.

The Maltman G. M. Co. has been incorporated by D. Cosgrove of Fresno and G. E. Stickles, W. Rose, J. G. Maltman F. J. Solinsky of Calaveras county.

At the Lancelle gravel claim, 2 miles from Mokelumne Hill, another clean-up is reported as having been made last week, after forty-two hours hydraulicizing, giving 107½ ounces of gold; one of the nuggets weighed two ounces.

COLUSA COUNTY.

The Bank of Williams has shipped quicksilver to San Francisco, hauled from the mine on Sulphur creek and weighing nearly 40,000 pounds, amounting to \$20,000.

EL DORADO COUNTY.

Near Fairplay, N. H. Burger is opening the river mine on the old Cosumnes.

INYO COUNTY.

G. Montgomery will sink the shaft on the Black Eagle mine at Ballarat 200 feet deeper. The present shaft is down 215 feet and will be enlarged and timbered before sinking begins.—The Radcliffe Co. at Ballarat has leased the water plant of the South Park M. Co. and will pump

water for the Radcliffe mine. The property is operated upon a paying basis.

Troeger Bros. of Cerro Gordo will resume operations upon the Dunphy mine September 1. They will put in a new hoist and other improvements.

KERN COUNTY.

Gas pressure is traveling across the Kern river field from east to west. The Imperial was one of the first wells affected. It spurted oil 50 feet above the top of the derrick. The disturbance has since repeated itself in a modified form. Not long after the Aztec well No. 7 was affected similarly and a little later the well on the Knob hill lease showed the effects of the gas pressure. One of the theories offered for the phenomenon is that the thousands of barrels of oil which have been taken out of the earth have left holes that must be filled with something and the most natural filling for them is gas. A great weight, the theory proceeds, has been lifted off the oil underground by a removal of a portion of the oil itself and the evolution of gas has been the result. This gas, having formed in great quantities, has created a pressure of its own and is making its way through the sands, travelling from the point where the force is greatest to the point of least resistance. If this theory is based upon a scientific presumption, a reasonable prediction would be that the more oil that is removed the more gas will develop until the wells throughout the field will become gushers, and that, finally, when the territory has become exhausted of oil, a great natural gas belt will remain.

MADERA COUNTY.

At Coarse Gold, T. Clark has bonded the Lingo mine.—The Alpha is working twenty men.

MONO COUNTY.

D. M. Riordan says: "In June, 1878, I was working in Carson, Nev., and was asked by my immediate superior, H. M. Yerington, how soon I could clean up my detail work and get ready to go out to Bodie. I told him I could be ready in a few hours. He said, 'I wish you would get ready to take the stage to-morrow morning and go out to the Syndicate mill.' I had my work 'rounded up' and was ready to leave on the following morning's stage, and upon my arrival took up duties of a subordinate character which I did my best to perform. In the course of a couple of months or so I was superintendent of the mill, which was then running as a custom mill on Standard ore. The Standard mine at the time was the big producer and dividend payer of the camp. Bodie was a typical mining camp, situated at an altitude of about 10,000 feet on the eastern slope of the Sierra Nevada and only about 4 miles from the Nevada State line. It was about 8 miles west of Aurora, one of the old phenomenal mining camps of Nevada.

"The Syndicate mill was a brick mill, the machinery in it being the odds and ends of half a dozen old mills put together to work Bodie ores. It was 115 or 120 miles from the nearest railway station. Freight was 2 cents a pound from the railroad. Wood was \$12 a cord. The camp grew from practically nothing to be a town of 10,000 people in a year and a half. The Standard mine, which was bought for \$40,000 by owners who never saw it, started in paying \$25,000 a month dividends after it was got in shape to work. These dividends were soon after increased to \$50,000 a month and subsequently to \$75,000, and during the three years I had knowledge of the property it never missed a dividend.

"There was one place in the mine that was called 'The Treasury.' The ore from this place was said to go \$10,000 to \$20,000 to the ton, and it was the custom whenever there were any extraordinary expenditures, in order to not diminish the dividends, to go into this place and get out a ton or two as needed to keep up the month's ordinary and extraordinary output.

"The Bodie mine was the adjoining claim on the south, and was sunk to the depth of 220 feet with a horse whim. The veins in Bodie hill were supposed to run practically parallel and to dip towards the center as depth was gained in a manner similar to the fingers of one's hand while held up with the open palm. Acting on this theory the Bodie folks decided to run a crosscut on the south line of the Standard property, which was the north line of their claim, and at the depth of about 250 feet. In doing this they intersected fifteen or seventeen different veins. The main vein, or the one which was supposed to be the Standard vein, showed little or no value where it was intersected, but a smaller vein, called the Burgess vein, showed some values and on this vein a drift was run which in going south a distance of 26 or 27 feet developed a chamber of ore over 9 feet in width, and which run up to nearly \$100,000 a ton.

"The Bodie folks immediately made arrangements with the Standard people to

change our mill from Standard ore to Bodie ore, and from that chamber of ore we milled and shipped over \$1,000,000 in gold bullion in six weeks. During the crushing of this ore, so rich was it, we ordinarily could not run more than five stamps, or one battery, although the mill was a 20-stamp mill with pan capacity to correspond. We have had the amalgam accumulate in the pans, not once but frequently, so that it would stop the engine.

"In one day's run, that I remember, we got about 900 pounds of gold amalgam. I have had the gold accumulate in a battery until, recognizing by the sound that the stamps were no longer crushing rock and that they were not striking iron, I would take off the screen to find that the gold had accumulated in the bottom of the mortar until it was flush with the dies, and I have taken out of a single mortar with an ordinary iron fire shovel, such as we used in cleaning up, free gold enough to fill a Wells, Fargo express box. Eighty pounds of amalgam from one charge in the pans was a very usual thing during that run of ore, and we were obliged to retort during the whole time as rapidly as the retort could be cooled and a fresh charge of amalgam put into it.

"During the run of this ore, Peter Holmes, Bob Pixley and myself one day went into the mines, and, before going, stopped at one of the stores and got an ordinary 5-pound shot bag to take with us for a sample sack. We filled this shot bag with loose dirt scraped out of the face of the drift with our hands. From this we panned out, in Peter Holmes' office after coming down, gold enough to make four matchboxes. Any miner will understand what this means. It is a fact that this run unfitted some of our best men for ordinary mines or ordinary ore thereafter.

"After the richness of this ore and the fact that it was likely to be continuous for some time, at least, became established, more or less watch was kept upon my movements. Sometimes Jim Dawley, who was then the superintendent of the Standard mill, represented the Bodie Co. in receiving and melting the bullion, used to come down to our mill and get the results of the day's work. At other times, if it was late or inconvenient, rather than take the risk of carrying the bullion over night in the little wooden shack, I would take it up to him in our ordinary mill wagon. I had a pretty good team, which all the Bodieites will remember—old Selim, in particular. One evening, when I was to have gone up with the bullion myself, something occurred at the last moment to detain me at the mill and I sent another man up in my stead. That was the last we saw of him alive. The horses ran away just as they were entering the town, and when they were stopped the poor fellow was found lying in the wagon riddled with buckshot. The bullion was untouched. No trace of the murderers was ever discovered."

The Syndicate M. Co. of Bodie district reports \$4170.31 cash on hand Aug. 1, 1902. The Goleta Co. at Jordan will resume. Superintendent Nelson will make a raise from the 700-foot tunnel level to the 350-foot level, where there is a 35-foot ledge of \$12 ore.

NEVADA COUNTY.

The Empire mine, near Grass Valley, employs 140 men. It is projected to sink from 2800 feet—the present depth—to 3500 feet; and, with this idea in view, Superintendent Starr has put in a forty-drill air compressor.

The Pennsylvania plans to resume about the 18th.

The W. Y. O. D. Co. will turn its attention to the Kate Hays property.

E. Creller, superintendent Union Hill mine, says that the company is now working toward the reopening of the property.

At the North Star Superintendent Foote is reported to have the same rich ledge at the 1900 level that was tapped at 1100 feet.

PLACER COUNTY.

The Sentinel says that the Haub drift gravel mine at Shady Run has been sold to Tacoma, Wash., men, incorporated under the name of the Haub M. Co. G. T. Crozier of Tacoma is manager and R. Watson is superintendent. The mine has been operated for several years by Mr. Watson.

SAN BENITO COUNTY.

A company to reopen and develop the Cerro Conito mines is about to organize at Hollister.

SAN BERNARDINO COUNTY.

The city of San Bernardino has plans prepared for 12 miles 4 to 20-inch cast iron pipe and 20-inch steel mains for a new water supply to be secured from artesian wells and mountain streams.

Brown-Gosney Co. of Manvel have bought the Wanderer group of claims, 50 miles west of Manvel, 1½ mile southwest of Tennenbaum's turquoise camp, for \$10,000. This is a silver and gold property, and

has been worked for seven years. It is the intention of the new owners to unwater the mine, sink the shaft 200 feet and commence extensive drifting and crosscutting.

The Bagdad M. & M. Co. is working sixty men and daily extracting 100 tons of ore. The best of it is milled, the remainder piled up to await completion of the railroad.

The Ludlow & Southern Railway has incorporated in Los Angeles to build a railroad to connect with Ludlow on the Santa Fe on the desert, and to run to three mining camps, 8 to 15 miles away. It will be narrow gauge and will run to the Gentry camp, thence to Camp Rochester, with a branch line to Roosevelt.

The Ontario M. & M. Co. has incorporated at Ontario; W. Kaiser, H. B. Wilson, J. D. Henderson, J. Kennedy and T. E. Parke.

The Bronze mine at Vanderbilt is working ten stamps.

SAN DIEGO COUNTY.

W. E. McEwen, superintendent for the company that recently bought the Nobles' group of claims at Pine Valley, has put on all the idle miners he could find in Julian.

SANTA BARBARA COUNTY.

The refinery plant at Carpinteria is being completed. The Union Metal Co. has a dug well containing 1000 barrels of liquid asphaltum, from which to draw for the first work of their refinery. Their well is down 675 feet, with 13½-inch casing. It will probably reach the asphaltum stratum in 350 feet more.

It is now planned to consolidate several hundred wells in the Summerland district. If that goes through, nine-tenths of the interests in the oil district of Summerland will pass into the control of the syndicate, scores of pumping plants now operating independently abandoned, a large plant capable of operating all the wells constructed and the pipe lines changed so that the product of all the wells will flow into one reservoir. Nearly all the Summerland wells are in the ocean, short distances from the shore, and are among the most productive in the State.

SANTA CLARA COUNTY.

The Silver Creek quicksilver mines have resumed operations with increased furnace capacity. Under the new arrangements the output of the mine has been doubled. Hereafter it is proposed to treat thirty tons of ore per day.

The Santa Teresa property, on the Almaden road, is being put in shape to become a producer. The force of workmen is being increased.

SHASTA COUNTY.

The Keswick Crude Co. has an offer from a driller of Berkeley to sink an oil hole at \$2 a foot for the first 500 feet and an increase of 50 cents a foot for each subsequent 500 feet, to furnish everything but the casing.

A concentrating plant for the Washington mine, French Gulch, is being put in by J. S. Farrier, managing owner.

A hoist for the Union Creek G. M. Co., Coffee Creek, will be put in.

The Little Waxie mine, Shasta divide, is bonded by B. M. Newcomb of the Old Spanish and Uncle Sam mines. J. P. Munger will have charge of development work.

Manager Kendall has twelve men developing the Phoenix mine, formerly known as the West End, now under bond by the Mount Shasta M. Co.

SIERRA COUNTY.

Superintendent Morrell, at the Balsam mine, near Alleghany, has been working an upraise to strike the Red channel that crosses the property; the task is accomplished and pay gravel is now being taken from the channel.

W. H. Weldon has a mining property 3 miles southwest of Bald mountain that he proposes to develop this season.

SISKIYOU COUNTY.

(Special Correspondence).—A large vein of quartz has been struck in the Aida claim of the Yreka M. & M. Co.'s property, near Rollin. A contract tunnel was run in by Woodfill & Lewis and about 80 feet from the surface the quartz vein was struck. It shows an average value of \$7 per ton. The company are going to run about 1 mile of tunnels, drifts and raises, all by contract, the coming season. The cost will be less than \$4 per foot. All the ore will be broken by contract also, the miners agreeing to deliver ore in chutes for 60 cents per ton. The cost of mining and milling is not expected to exceed \$1.50 per ton.

Rollin, Aug. 12.

The Salmon River Co. have suspended work on the Myers claim, below Sawyer's Bar. Two giants and one elevator were used successfully and the company realized well from the season's clean-up. One more season's run can be made from this

claim. The company are contemplating a move to Summerville on the South Fork of Salmon river by the end of next season. It will be necessary to construct 8 miles of flume at a cost of about \$50,000 to carry sufficient water from the South Fork to Summerville.

J. Churchill and H. Steele are doing preliminary work above Fall Creek falls to install an extensive power plant. They intend putting up poles 30 feet high, 6 inches in diameter at top, to transmit 30 miles. They will have 700-foot fall to operate the dynamo below the falls.

The Siskiyou Electric Power Co. has begun the construction of an electric plant on the Klamath river; 2800 feet of pipe will be laid; capacity of plant, 2500 H. P.

Preparations are making to reopen the Greenhorn blue gravel mine, near Yreka. The bedrock strata of rich pay gravel, over 100 feet below the surface, contains an immense amount of water, requiring pumping to be kept up continuously.

STANISLAUS COUNTY.

A Keystone steam drill, weighing 17,000 pounds, is at Waterford, to be used at La Grange, in connection with the other drills at work for prospecting the gravel beds along the Tuolumne river for J. E. Doolittle and A. Brown, who are prospecting the river at La Grange for gold dredging purposes. The same people also have a steam drill at work on the Stanislaus river between Oakdale and Knights Ferry. The Independent says J. E. Doolittle will shortly place another drill on the Merced river, in the vicinity of Snelling and Merced Falls, to prospect the gravel for gold dredging.

TRINITY COUNTY.

A carload—62,000 pounds—of sulphurets from the mill of the Brown Bear mine, Deadwood, has been shipped to the smelters at tide water.

TUOLUMNE COUNTY.

P. George Gow, general and mining superintendent of the Jumper Gold Syndicate, California Limited, has brought suit against the company to compel an accounting and the payment to him of one-tenth of the net profits of the concern since July, 1896. The claim is based upon a contract made by him with the company at the time it became interested in the Jumper and other claims, and alleges that he was engaged for ten years to manage the property at a salary of \$420 per month and one-tenth of the net profits. This division of the profits was to be paid to him for his services in negotiating deals for the properties and was to continue as long as he lived and five years after his death. It is charged that the company never has paid him anything from the profits, and that on July 30, 1902, it declared that that part of the agreement was invalid.

At the foreclosure sale of the Moody mine property at Sonora, W. A. Nevills became the purchaser—\$10,000 for the entire property.

YUBA COUNTY.

At Browns Valley the development work or the search for a lode or vein in the old Pennsylvania mine ceases. A company represented by L. Scrutton has expended \$30,000 in an effort to find a new lode or an extension of the old vein that had been worked at different periods since 1856. Mr. Scrutton has paid all claims contracted under his administration and ordered the mine closed, as far as his company and contract are concerned. The great volume of water in the Dannebroge, Pennsylvania and Jefferson is said to be a bar to further expenditures.

From Browns Valley district a deed from S. L. and G. Lezinsky, president and secretary of the Commonwealth Gold Mines, Ltd., and Victor Gold Mines, corporations, has been recorded to Julian Sonntag of San Francisco—the Dannebroge quartz lode, the Pennsylvania mine, the Hawkeye, North Light, F. W. P., Victor and Blow Snake mining claims. The deed is a conditional one.

COLORADO.

BOULDER COUNTY.

(Special Correspondence).—The Boulder Amazon Oil & Gas Co. have their well down 1600 feet. They intend sinking to 3000 feet if necessary. They struck oil in the first oil sand.

The Crawford well have their new rig up and are going to sink another well at once.

The McAfee Co. are also going to drill another well.

Boulder, Aug. 8.

The Boulder News says it is the driest in the mountains ever known. Many mines that usually have to be pumped the year round are perfectly dry, and some of the camps are suffering for water for domestic purposes.

CHAFFEE COUNTY.

A very rare and valuable body of min-

eral on Crystal creek, 15 miles northeast of Salida, has been found; it is asserted to be bismuth ore of high percentage, eleven ounces gold and \$145 bismuth being the value of a 50-pound sack of ore taken by Ohalen & Flynn, miners from Cripple Creek, from the bottom of a 10-foot hole.

The Salida smelter, now nearing completion, is the property of the Ohio & Colorado S. & R. Co. on the main Arkansas river, 2 miles from the business center of Salida. The capital for the enterprise comes mainly from Cleveland, O., and vicinity, and already about three-quarters of a million have been expended in construction work. J. C. Kortz of Cleveland, O., is the president of the company, T. Goodwin of Denver and Leadville is the general manager. The other officers of the company are: H. G. Reddington of North Amherst, O., vice-president; J. M. Thomas of Columbus, O., treasurer; H. G. Steinbrenner of Cleveland, secretary. These five constitute the board of directors of the company. The chief owners of the smelter are also the chief owners of the New Monarch mines at Leadville. This property will supply some ore to the smelter, the management stating that the production will be an average of 300 tons per day. Contracts for ores are being made. All characters of ore will be treated and are wanted, excepting zinc ores. There are two furnace buildings now complete, the lead and matte furnace buildings. The lead furnace building is 40x120 feet, walls 24 feet high. There are four furnaces, each with a capacity of 160 tons per day. In the rear of this building and on a foundation 6 feet higher is the matte furnace building, 40x60 feet, two furnaces, each with a capacity of 300 tons a day. These two buildings are so arranged that the tops of the furnaces are all on a level. There will be one feed floor for all of the furnaces, enclosed by a corrugated iron canopy top. Between the two furnace buildings is the flue chamber, which extends 300 feet on a level with the foundations of the furnace buildings and then turns at right angles up the mesa bench to the stack, a total distance of 673 feet. The stack is 150 feet high, 30 feet square at the base. This gives the total draft through the flue chamber and stack 823 feet. The flue chamber is 24 feet wide at the base and is arched over, the top of the arch being 24 feet above the floor.

George Briethaupt is superintendent of the Futurity mine, 6 miles north of Turret. The ore vein is 3 feet in width—\$2 gold, \$2 silver and 25% copper. It is owned by an incorporated company, of which George Smith of Cripple Creek is president.

CLEAR CREEK COUNTY.

At Yankee the Silver Creek Mineral Co. is formed on a reorganization plan from the old Alice M. & M. Co. The new company has laid out a townsite and plans are formulated for extensive improvements, among which is contemplated an electric line of railway from Idaho Springs to the property.

Yankee also reports a strike in the Lombard, a property of the Yankee Con. M. & M. Co. In the second level of the mine in the slope the vein is 11 feet wide of smelting ore, the remainder mill ore worth \$15 a ton.

At Empire the Republic Con. is excavating for a new mill at the foot of Douglas mountain, for the treatment of their ores exclusively.

H. H. Sturm will put in a 1000 H. P. plant on Bard creek.

C. H. Fuller is foreman Conqueror mine at Empire.

At Silver Plume it is reported that the Mexico & Seneca group, consisting of several patented claims, will resume operations. The property is under the management of C. H. Morris. The last ore extracted gave returns of 302 ounces silver and 40% lead. The main tunnel or adit level has a depth of 750 feet. The mine was closed during 1893.

The strike in the Burleigh tunnel continues to improve. This was struck on the 7:30 lode, being driven to connect the Burleigh tunnel with the 7:30 and Bismarck group. A drift 1300 feet westward from the Burleigh and raising 240 feet will connect the two.

Manager Dean Burgess of the Republic Con., near Empire station, tells the Georgetown Courier that the tunnel of this company is in 243 feet, and has just cut a 24-foot lode carrying pyrites, peacock copper, gold and silver in a series of streaks across the lode. The grab samples assay about \$120 a ton. Manager Burgess says the company is breaking ground for a new concentrating mill for Republic ores.

East Argentine district is active, many properties being developed, the Santiago, North Star, Waldorf, East Argentine Co., Vidler and other properties doing considerable work. East Argentine produces smelting ores. The East Argentine Co. and Vidler Syndicate are erecting dams;

their first use of the water power will be for operation of air and electrical drills.

CUSTER COUNTY.

The Maverick mine at Rosita has been leased and handed to the Custer M. & R. Co., who will sink a new shaft.

The Powhattan mine, Silver Cliff, has been leased to C. H. Aldrich and A. B. Robinson of Jackson, Mich., and W. H. Bliss of Chicago. The mine is being enlarged.

CILPIN COUNTY.

(Special Correspondence).—The Delmonico G. M. Co. here are down 800 feet and sinking 3 feet per day. They intend to go 1200 to 1500 feet before stopping. The policy of this company is to develop and block out ore before shipping. J. H. Eaton is secretary and treasurer.

Central City, Aug. 9.

During the last week of July the shipments of smelting and crude ores, mill tailings and concentrates from the Black Hawk depot to the Golden and Denver smelters and to outside points were 96 cars of 1920 tons, making a total of 409 cars, or 8180 tons, for the month of July. In comparison with the same month of the previous year, last month's shipments show a gain of 99 cars, or 2450 tons, an increase in the tonnage of nearly 50%.

CUNNISON COUNTY.

(Special Correspondence).—I. L. Johnson of Culpepper, Va., is developing his property on East Gold hill, Tin Cup district, driving a tunnel to cut the vein at its deepest point, 800 to 1000 feet deep, to be 1 mile in length, and will run on the vein nearly all of the way. The vein as far as developed has produced pay ore at three different points.

Gunnison, Aug. 9.

The destruction of the Colorado Fuel & Iron Co.'s power house at the Crested Butte mine by fire has caused a temporary suspension of coal production. Several boilers and a large compressor were practically ruined. The loss is estimated at \$20,000.

At Apex Manager Mounts will start the Elk Park mine and mill for the Eastern men who recently bought the property.

LAKE COUNTY.

(Special Correspondence).—The Blaine Electric & Power Co. will put a gasoline engine and an electric power drill on their property. The company has 250 acres of mineral land and 300 acres of timber. They employ at present eighteen men around the mine. They have a tunnel in 150 feet and intend driving it to cut the thirty veins on the property. The ore is gold, gray copper and silver. With the new drill they hope to be able to drive 8 feet per day; W. H. Applegate is general manager.

Twin Lakes, Aug. 10.

Near Leadville the Silent Friend mine in Big Evans gulch is reported shipping 400 tons per month.

Regarding the trust ruling as to Leadville assayers in last week's issue, a modification of that rule is now reported. Instead of its application being general, it is confined solely to the Arkansas Valley plant. All ore sent to the valley can be umpired according to the method heretofore in vogue—that is, the smelter furnishes a list of assayers, some in Leadville and some in Denver, who are considered by them to be satisfactory. The mine and smelter alternate in picking an umpire from the list. But under the new rule this only applies to ore shipped to the valley. Ores for the local plant follow the rule stated last week—that is, settlement on the smelter assay or umpiring with Denver assayers named by the smelter. Splits are allowed on ore going out of the camp, but not otherwise. The reason for this limitation of the rule to the Arkansas Valley plant would seem to be that much of the trouble over assays is in the case of gold, and at present the Arkansas Valley is receiving the bulk of the siliceous ores, while much of the sulphides and iron goes to the valley. The smelter is taking a large quantity of low-grade material from the gold belt, and it is evidently the purpose to force a settlement for this ore on practically whatever terms the smelter may dictate. But even with its more limited application, mining men consider the enforcement of the new rule as arbitrary, and are inclined to believe that it is part of a well-considered policy on the part of the trust to bring about certain changes, but, realizing that there would be a "howl," it has decided to introduce the changes gradually, so that the miner would become used to them, but that eventually the rule would be extended so as to cover all ore shipped from the district, thus placing the assay basis of settlement wholly in the hands of the smelting company.

Shipments by the Gold Basin M. Co. and the work now being carried on through the new shaft sent down by them on the old Big Four ground indicate to Leadville people that they have the extension

of the old Big Four vein, which as developed is almost vertical in the quartzite.

Manager Brooks is pushing drifting and prospecting on the Diamond shaft and is drifting for the Resurrection ore shoot extension.

LARIMER COUNTY.

(Special Correspondence).—The Boston & Colorado Copper M. Co. are making arrangements for the erection of a smelter at this point.

Fort Collins, Aug. 8.

PUEBLO COUNTY.

The American Smelting & Refining Co. has closed the Philadelphia smelter at Pueblo because of a shortage of ore, and a new smelter has just been started at Murray, Utah.

SACUACHE COUNTY.

(Special Correspondence).—The Little Sister G. M. Co. are developing their tunnel. Their ore is a concentrating proposition and will average about \$30 per ton, carrying gold, silver and lead.

Bonanza, Aug. 7.

SAN JUAN COUNTY.

Near Silverton, Superintendent Halverson of the Freeport & Cripple Creek G. M. Co. is pushing operations on old properties, containing twenty acres, on Tower mountain.

Near Silverton the drills at the Grand Mogul mine, upper Cement creek, have cut the main vein 1700 feet from the mouth of the tunnel and opened up an ore body 24 feet in width, averaging \$15 per ton.

SAN MIGUEL COUNTY.

Copper claims have been discovered 15 miles from Telluride.

The county and two mining companies at Telluride offer \$6000 reward for the arrest and conviction of the person or persons who caused the disappearance and death of two residents of Telluride.

SUMMIT COUNTY.

(Special Correspondence).—The Mountain Pride Gold Mines Co., D. P. Marvel manager, employs twenty men and is taking out ore. They shipped nine cars of concentrates and one car of crude ore in three weeks of last month. When their elevator is repaired they will double their output.

J. A. Bush of Salt Lake City is getting the Glen-Mohawk M. Co. started. He has been straightening up the property, running a tunnel and doing considerable development work in the mine. The tunnel now has a length of 700 feet.

Breckenridge, Aug. 8.

(Special Correspondence).—The Goldpan M. Co., George H. Evans general manager, have their tailings ore dump completed and ready for operation. The elevator sluice boxes are dumped onto a belt conveyor and carried at an angle of 27° a distance of 110 feet, thence dumped to another conveyor which runs on an angle of 7° a distance of 300 feet. The total radius of the conveyor is 410 feet and tailings are stacked to a height of 72 feet automatically by means of a tripper. The Goldpan people have the largest plant of its kind in the country. They are now putting in pumps to overcome the shortage of water. They are within about 2 feet of bedrock, but it will probably be two weeks before they reach bedrock.

Breckenridge, Aug. 8.

Near Frisco, the Admiral group of mines is to be worked by machinery and the development tunnel, 4½x7 feet, driven by electric drills with two shifts of men.

The North American G. D. Co., at Breckenridge, has produced five gold nuggets aggregating in weight 390 ounces 6 dwts. The Bucyrus dredger is daily handling 2000 tons of gravel; the ground sluices are showing up well.

TELLER COUNTY.

The Moon-Anchor mine has been leased to N. Wilson.

E. M. De La Vergne, general manager Elkton Con. G. M. Co., says of developments in the 700-foot level of the Elkton mine: "One can get almost any values desired, so it is not right to say at present what the average value of the ore will be. We have sunk a winze about 10 feet deep below the floor of the seventh level, and find that the vein is contracting and is apparently about 3 feet wide. The values seem to have been compressed into this vein, which produced a high grade of ore, instead of being disseminated through the mass as it was in the level."

The old Oneida and Detroit mills are dismantled. Since the inception of the camp there has been a total of fifteen mills in the camp, and to-day there are but three operating—the Brodie, Aregua and Economic. The others were of that type not adapted to the treatment of the ores.

J. K. Brewster has been appointed Inspector Londonderry G. M. Co. and the Wild Horse, owned by the United Mines Gold Co.

Victor reports 5 feet of mineral developed on the 500-foot level of the Ritten-

house claim that runs less than pay, but with a streak 13 inches wide that runs nearly \$100 gold. Manager R. G. Mullen will extend laterals on other levels to the shoot.

A strike of sulphide ore carrying 4000 ounces of silver and a percentage of copper is reported on Bull hill, the center of the Cripple Creek district, at a depth of 1365 feet. This would seem to bear out the theory that deep mining would change the character of the district's output.

At Cripple Creek Manager J. W. Phillips of the Ben Hur M. & M. Co. says that the shaft, which the company has sunk 650 feet, will be sent down to the 800-foot level.

The annual report of the Independence Con. G. M. Co. for the year ending June 30 has been received by the stockholders. The cash on hand June 30 was \$12,286 95, with bills payable amounting to \$21,000. The report of General Manager W. P. Dunham shows 2745 feet of sinking, drifting, crosscutting and level work accomplished during the year, with 563 feet of upraising, 65 feet of winzes cut and 141,734 cubic feet of stoping done. The main shaft, from which operations are conducted on company account, was sunk 203 feet, its present depth being 1082 feet. A station, 15x16x26 feet, was cut at the ninth level on both sides of the shaft. The Glorieta M. & L. Co., on the Whiting lease, accomplished 931 feet on levels, crosscuts and drifts, sank the shaft 83 to 87 feet and accomplished 72,630 cubic feet of stoping. On the Worthing Moon lease 230 feet of drifting and crosscutting on levels was done. Mr. Dunham reported that the damage to the mine caused by the settling of machinery was not serious, the loss being under \$2000. The lessees have resumed operations through the main shaft, which is in better condition than ever, and hoisting and other mining operations are progressing without interruption. Up to the time of this accident the company was receiving about \$6000 in royalties. The shutdown was entirely responsible for the company's deficit of approximately \$9000. All taxes and expenses are paid to date. The lessees are establishing a station at 1050 feet, and are unwatering the mine. The water situation has at no time been troublesome. Crosscutting will start as soon as the lower workings are dry, which is expected daily. At 950 feet a new ore shoot, not less than 300 feet long, has been developed in the heart of the property. The organization owns forty-six acres of inside property in the town of Independence, of which the Hull City placer is the most important. The company is capitalized for \$2,500,000, divided into as many \$1 shares. Eren Smith is president, W. S. Montgomery vice-president, E. G. Thomas secretary and treasurer.

At Victor the Bull Hill M. & D. Co., Superintendent R. D. Wattles, will explore the twenty acres of the Cresson M. Co., lying south and west of the Gold Sovereign, on Bull and Raven hills. The base of operations will be the Marie shaft on Raven hill, where at a depth of 300 feet a crosscut will be driven east for 300 feet into Bull hill for the Fox vein, which, it is believed, will be cut at a depth of 500 feet.

On the 9th inst., the Brodie mill, in Squaw gulch, was destroyed by fire. The mill was leased three months ago by O. B. Finn, and had been running steadily since he obtained the lease on low-grade dump ore, which was being successfully treated. Mr. Finn's loss will amount to about \$4000, which was in material and ore in the building. The mill was owned by the Gold & Silver Extraction Co. of North America; it was built in 1893 at a cost of \$150,000. For some time W. A. Russell of Denver has been general manager for the Scotch syndicate. An insurance of \$35,000 was carried. This is the last of three mills which were built in Squaw gulch. The Rosebud mill was burned and the old Hartzell mill was torn down.

On Rhyolite mountain M. O'Hara will do 1000 feet of boring with a diamond drill in the Metallic tunnel. It is estimated that this prospecting work will cost over \$4000. The Metallic tunnel has been driven 800 feet and a winze sunk 150 feet near the 600-foot mark, where a low-grade vein 42 feet wide was found, but with depth the ore increased in value. Lessees have developed the continuation of the Mary McKinney ore shoot on the Colorado Boss claim No. 3, belonging to the Cripple Creek Con. Co., showing that the Mary McKinney ore shoot is the longest developed ore shoot in the entire district. So far the ore shoot has been opened a distance of over 2300 feet.

Rhyolite mountain is to be prospected with a diamond drill by the Metallic Tunnel Co., who intend to drill 1000 feet before driving to the breast of the tunnel.

IDAHO.

BANNOCK COUNTY.

Near Pocatello J. F. Cooney and others

are developing a vein of nickel and cobalt on Terrell creek, which is locally reported to "assay 20% nickel, 10% cobalt and 15% lead."

BLAINE COUNTY.

Manager Rockwell of the Minnie Moore says he has sufficient quantity of ore developed to keep the mill going one year. The mill has a daily capacity of fifty tons.

In the Della Mountain Co.'s Idaho Democrat mines, Watt & Brennan, the owners, began a tunnel last January that was intended to explore the vein to a depth of 1100 feet. This tunnel was driven 580 feet, when it cut the vein. Its course was then changed so as to follow the vein. Since then it has been driven 200 feet in the vein, which averages 5 feet in width and carries silver, lead and gold, being good concentrating ore. When completed the tunnel and drift will be in 2100 feet, and under the first ore chimney.

BOISE COUNTY.

Mr. Ingle found that the ore on the dump at the mines of the Twin Sisters Co., at Centerville, was rich—not in free gold but a telluride. He went to the company and got a bond for \$15,000. When the bond was signed he asked for discount for cash. The company agreed to take \$11,000, which he paid, and is now the owner of the mines. The Idaho City World says that the company that sold to Ingle did not suspect that the ore carried telluride.

CUSTER COUNTY.

G. R. Hancock, in charge of the White Knob copper mine at Mackay, writes to Eureka, Utah, that the miners who accompanied him from there are earning \$3.50 per day for eight hours on machine work, and the same wages for ten hours on hand drills.

IDAHO COUNTY.

(Special Correspondence).—The new camp of Thunder Mountain, which was so extensively boomed by the newspapers, is at present in the doubtful stage of its life as a camp.

Roughly speaking, there is a mountain of porphyry carrying gold throughout, but in small quantities; a few bunches of rich rock have been discovered, but the mines if they materialize will be high low-grade propositions. The properties of the Pittsburg companies have been examined and the reports will determine whether it is advisable to proceed with the development of the mines.

"Thunder Mountain is not a poor man's camp and it was a mistake of the local papers to boom it so much," is a statement made by E. Dewey to me Aug. 1st at Nampa. The distance to the camp from the railroad is nearly 200 miles; and a large portion of this is at present over trails.

The stories of returning prospectors that there is nothing in Thunder Mountain can be set aside. Such tales are told of every mining excitement. The proposition is whether this mass of low-grade ore will pay to mine and mill. The chief difficulty will be the high cost of transportation, and building a wagon road over a very difficult country.

Thunder Mountain is not dead; another year will see either the abandonment of the camp or the active development on a large scale of low-grade ore.

Roosevelt, Aug. 5.

The Silver King G. M. Co., Thunder Mountain, say they will put in a complete electric drill plant, and a steam power plant for their stamp mill.

B. C. Kingsbury, at Elk City, has bonded the Blue Ribbon group. The bond requires that he keep continuously at work on it during one year; he has ten men there now. The Blue Ribbon is free gold and concentrating. A tunnel has exposed a ledge 9 feet wide, running \$9 in gold. Elk City, of course, is an old placer camp, which had 3000 people there forty years ago; most of the placer ground has been worked out.

OWYHEE COUNTY.

The Avalanche reports that in the Lucky Fire mine, near Silver City, the quartz will run \$30 to the ton. As a result of the assays a local company has organized and bought the property. The new corporation is the South Sinker G. M. Co.

SHOSHONE COUNTY.

Since June 1st, the Wild Rose gold mine, at Pierce, has treated 100 tons of ore, which yielded \$8000 from the plates. The property is owned by the Dunn Bros. of Wallace, T. Wilkinson of Kellogg, and M. A. Ellis of Pierce.

H. H. Burns has the lower tunnel of the Snowstorm in 145 feet.

The Black Cloud mill, near Wardner, is now in regular operation.

The Highland Chief mine on Pine creek is bonded by a St. Paul company for \$100,000, 10% down. It is said that all the men that can work to advantage will be put on.

The Highland Chief mine, Pine creek,

is bonded by a St. Paul company for \$100,000-10% down. All the men that can work to advantage will be put on.

WASHINGTON COUNTY.

At Mineral, 23 miles from Weiser, the smelter will have new machinery and equipment. The capacity is 150 tons daily. Ladd & Tilton of Portland, Or., have bought the smelter and several claims in proximity to it. G. M. McDowell is superintendent and general manager of the smelter and mines.

L. M. Morton and J. Knight of Pendleton, Or., will organize to develop the Morton copper mine near Mineral.

MISSOURI.

JASPER COUNTY.

St. Louis reports that the lead combine, discussed in the issue of the 2nd Inst., is now nearing its consummation. While its promoters are more than ordinarily reticent, it is definitely known that the scope of the merger will include most of the white lead plants east of the Mississippi river, the principal pipe and sheet lead plants, a number of sheet and company manufacturing products in which lead forms one of the chief components. Included in the merger will be the Union Lead & Oil Co., which was organized last year by the Ryan-Whitney coterie of capitalists, with a capital of \$10,000,000, and which controls the Bailey process of manufacturing white lead. Overtures made to induce the National Lead Co. to join the merger are said to be favorably looked upon by a portion of the directorate. Behind the merger are the Ryan-Whitney and American Smelting & Refining Co. interests. Options have been secured on a number of corroding plants of the country, notably the Chadwick Co. of Boston, Mass., and the Raymond Co. of Chicago, Ill. If the merger is completed successfully, it will control the lead manufacturing interests of the country and indirectly, through its alliances, the pig lead market. The plans of the promoters favor a corporation with a capitalization of not less than \$50,000,000. The papers will probably be filed in New Jersey during the next sixty days, although definite announcement of the status of the merger is looked for before the expiration of that time. The lead producing properties in southeastern Missouri, Colorado and the Cœur d'Alenes will not be included in this merger, but will be the basis of a second corporation with a capitalization of not less than \$25,000,000, to be consummated after the manufacturing merger has been effected.

MONTANA.

CASCADE COUNTY.

At Great Falls, E. B. Braden says there is but slight hope of early resumption of operations at the old silver smelter. Mr. Braden was United States assayer and is now manager of the East Helena smelter and in charge of the business at the American S. & R. Co. in the Northwest. "Primarily, of course," he continued, "the cause of the close-down of the smelter is the failure of the mines at Barker and Neihart to come up to expectations. If these mines were making the output expected when the railroad was built to them, the smelter would be in operation. Whether Canadian ores from the East Kootenai country could be brought over the Great Falls & Canada will depend upon what arrangements can be made with the Canadian Pacific road, and also upon the London market for lead. Present conditions are none too hopeful that such ores can be handled. Two years ago lead on the London market was quoted at £18 per ton of 2250 pounds. Now it is down to £11, or about \$2.14 per hundredweight in United States money. The smelter here is also expensive to operate and is remote from such class of ores, fluxing ores, as are necessary for cheap commercial smelting. It is idle to talk of bringing Cœur d'Alene ores here. The Northern Pacific would prevent anything like that. Everything at the East Helena plant is running nicely now. The men are all back at work and we will blow in the third furnace. I have not heard authoritatively as to the resumption of work at the Frisco mine in Gem, Idaho, where a number of Montana people have interests, but there are reports that the mine will resume. The output from the Cœur d'Alene mines this year will be about 25% higher than for the year ended July 1st last. This decision to increase the output one-fourth is the result of an agreement between the mine owners and the smelter, our interests being identical respecting a market for the product."

DEER LODGE COUNTY.

The injunction granted by Judge Harnay on the Speculator mine, in the case of Lee Mantle against the Speculator M. Co., was served on the 9th on Superintendent Wishon and the mine closed. The Standard says: "About 285 men were laid off

to join the 400 thrown out of employment by the Minnie Healey injunction."

At Gold creek, on which the town of Pioneer is built, L. U. Loomis, manager Gladstone G. M. Co., will have a 25-ton cyaniding plant and stamp mill.

DALY COUNTY.

The report of the Anaconda M. Co., which operates the Anaconda, St. Lawrence, Never Sweat, Mountain Con., Green Mountain, Bell and High Ore, shows for the year:

Ore mined, tons.....	984,958
Gross value per ton.....	10 68
Cost per ton mining.....	3 80
Total paid for mining.....	3,742,312 20
Cost of transportation per ton to Anaconda.....	15
Total cost of transportation.....	147,743 70
Cost per ton reduction.....	3 32
Total cost reduction.....	3,267,182 32
Paid for labor.....	3,860,789 41
Paid for machinery.....	3,148,705 11
Paid for freight.....	147,743 77
Marketing, seaboard costs, refining and selling.....	2,052,105 58
Total net proceeds for year.....	1,289,610 02

From the above statements it can be seen that mining, transportation and treatment of the ore cost \$7.27 per ton; there was a charge of about \$2.15 for marketing the product, refining and charges other than smelting.

FERGUSON COUNTY.

At Lewistown the New Year mines have seventy-five men employed in the mill and mines.

Surface water in Ruby gulch has put a stop to nearly all work in that district.

Yogo reports that G. Hall has a vein of ore carrying values in silver and gold.

GRANITE COUNTY.

T. W. Barnes and A. Mathez, president and consulting engineer Dorothy G. M. Co., are at Phillipsburg to arrange for building a quartz mill 4 miles northeast of Granite.

The clean-up at the Syndicate mines, in Basin gulch, is finished. The ditch which carries the water from the head of the west fork of Rock creek is 14 miles long. Difficulty is experienced by seepage of water through slate rock along its course. These flumes have been built where there was considerable loss of water. Near the head G. Ammerman has men tapping a lake, driving an open cut to divert the water from the lake into the ditch, to insure constant supply.

JEFFERSON COUNTY.

Three miles from Boulder, W. K. Mallette will superintend development of a group of mining claims. S. Myhre has put the property in shape by unwatering and timbering.

LEWIS AND CLARKE COUNTY.

(Special Correspondence).—The Big Indian, on Big Indian gulch, is to be worked again. In 1891 Winscott Bros. operated a 10-stamp mill on the ores of this mine. The mine has been worked as an open quarry, over 200 feet in width. The owners sold the mines a few months ago to A. C. Mason of Tacoma and associates, who will build a 60-stamp mill of 850 pounds each, operated by electric power from M. R. P. Co., at Canyon Ferry on the Missouri river, 16 miles northeast of here. The power will be delivered to two motors located in the mill, each of which will independently furnish power to operate thirty stamps. The mill and improvements were designed by C. McIntosh, who is superintending its construction.

Six or seven miles easterly of the Big Indian mines are the Bonanza Chief and Overland mines. The Bonanza Chief vein has been crosscut 225 feet between walls. These mines closed because the owners lack the capital to operate them.

Two miles east of the Overland there is a dyke of porphyry lying between the lime and granite, known as the Gold Hill. It is over 100 feet in width and so thoroughly mineralized that every pan of crude ore will show colors in panning. It is interlaced with streaks of siliceous ore, a quantity of which has been milled, yielding from \$3 to \$72 per ton in gold. Every gulch and bar below this gold belt, as it crosses McClellan and Mitchell gulches, contains placer gold.

Helena, Aug. 9.

An express carload of cyanide product worth \$30,000 was recently shipped from the Drum Lummon cyanide plant at Marysville to an Eastern refinery. The cyanide plant has a capacity of 400 tons of tailings per day. The plant is on Silver creek, 3 miles from Marysville. It is treating the tailings from the Drum Lummon mine—the accumulation of the long milling operations of the company—and fill the bed of Silver creek for 5 or 6 miles below the 110-stamp mills belonging to this company at Marysville. The company owns the entire gulch and has enough tailings to continue the operation of the plant for years. The annual report

of the company shows that the profits made from the tailings are greater than from the mills.

MADISON COUNTY.

The Watseka assay office at Rochester was totally destroyed by fire last week. Of the contents the scales alone were saved.

SILVER BOW COUNTY.

The Minnie Healy mine has shut down on orders from the Supreme Court, which refused to grant a rehearing or stay in the injunction. The Boston & Montana furnished a bond for \$300,000, as required by the court, for the purpose of indemnifying Heinze. About 400 men are thrown out of employment.

NEVADA.

ELKO COUNTY.

The Dexter Co., Tuscarora, in June turned out in gold bullion and cyanides \$15,200; during July, \$15,300.

HUMBOLDT COUNTY.

C. L. Taylor, returning from his Granite Point borax plant, on the extreme southwestern edge of the Black Rock desert, heard of the discovery made in the range of mountains across the desert to the northwest, went there and found everything had been located before he arrived. He confirms the report of the richness of the ore, which assays from \$60 up, but says the ledge is only about 1 foot in width, and not enough development work has been done to determine to a certainty the extent or value of the discovery. It is very promising, but the situation is not such as to warrant a rush to the new district at present. The country has not been prospected to any extent, however, and it is probable that other discoveries will be made. The nearest railroad point to the strike is Amdeee, Cal., on the Nevada, California & Oregon Railroad, about 125 miles from there, across a rough country.

The Sheba G. & S. M. Co. have assays from recent samples showing 804 ounces silver and \$6 gold per ton. The Sheba tunnel is in 639 feet. Milling ore is being taken out to pay expenses and high grade is steadily sacked.

LINCOLN COUNTY.

The Quartette Co., at Searchlight, will sink the main incline shaft to a depth of 750 feet; its present depth is 450 feet. As there is considerable water in the mine, a pumping plant will be put in.

Nevada Keystone M. Co. has incorporated at Pioche.

LYON COUNTY.

Silver City reports a mining deal under way whereby the Quinn mine is to be sold for \$40,000.

Repairs to the Pollard mill in Silver City are completed; the mill is crushing ore from the Silver Hill mine.

The mining suit of F. Golden vs. Murphy et al., involving question of apex and other rights to mineral ground, and damages amounting to \$5000 for ore alleged to have been taken from the Canyon claim, is won by defendants.

NYE COUNTY.

J. E. Durkee, president Consolidated Mines Co., Hawthorne, says his company will put \$750,000 into a mill, cyanide plant, water works and electric plant in Tonopah mines. He says work will be commenced immediately. His company will put a pipe line from Twin river, conveying water 65 miles, into Tonopah, and put in an electric plant to transmit power.

At Tonopah water is now 3 cents a gallon to every body. Before large consumers paid 2½ cents. About ten wagons are in the business. The Tonopah Co. has its own wagons. Two trips a day are made to the wells 4 miles away. From 350 to 600 gallons are hauled at a load.

A contract has been let by the Tonopah Co. on the three-compartment (Siebert) shaft to sink 100 feet, at \$25 per foot, the company to do the hoisting, furnish timber, powder, etc. If the work is done in thirty days the miners will receive \$5 per day, otherwise \$4.50 per day.

At Tonopah, on the 3rd inst., Lynch & O'Meara gave up their lease on the Mizpah ledge, letting out 180 men. It is reported that they have been clearing \$12,000 each twenty-four hours. They had reached a depth of 300 feet. The ledge is stated to be 7 feet wide where they quit and better than \$400 per ton—two-thirds silver and one-third gold. It is said they were paid an additional \$200,000 to give up the lease, which did not expire until next month. This is stated by J. A. Yerington. He also says that \$750,000 is paid at New York, to be invested in the company's pipe line, from Twin river to Tonopah, 65 miles. They expect to let contracts next month. He thinks it is the only instance in the history of the State when three-quarters of a million had been put up at one time for investment. He estimates that it will take eight months to com-

plete the pipe line, and thinks water will be running into Tonopah next May.

Twenty miles from Tonopah and 12 miles from Silver Peak is the new district of Weepah, where the ore occurs between lime and schist. There are three ledges in the Weepah group, from 8 to 20 feet in width, and they carry free-milling gold. C. D. Van Duzer has returned from Philadelphia, Pa., and says the company will expend \$400,000 by next June. The company now has twenty-five men at work and will increase its force. The first payment of \$40,000 is due Sept. 11. G. F. Hensel of Philadelphia, Pa., is at Tonopah to make a consolidation of eighteen claims, and then form a company. It is believed the Tonopah ledge runs through that ground.

The \$1,000,000 to build the Tonopah water works has been subscribed. Tonopah citizens deny the existence of any epidemic or pest there.

Lone Mountain M. Co. has incorporated at Tonopah; branch office in Chicago, Ill.

Tonopah G. M. Co. has incorporated at Tonopah.

There are now employed in the mines Tonopah proper 400 men. Besides, fifty are at work in Klondike, twenty in Liberty, twenty-five in Ray, twelve at Gold Hill and forty at Weepah.

W. H. H. Rhodes, one of the owners of the recently discovered deposit of nitrate of potash and soda near Duckwater, says that the development work recently done on the property was not satisfactory, and that it has been decided to discontinue work.

The Tonopah Eclipse M. Co. has been incorporated by A. L. Dowler, W. Kolman, C. J. Hasman, J. D. Feldman Jr., M. F. Smith.

STOREY COUNTY.

An addition of five stamps to the battery at Fisher's mill, in Six Mile canyon, near Virginia City, is being planned.

Five carloads of the Reider pumping machinery for the C. & C. shaft have been delivered on the Comstock, and five carloads more are in transit. L. M. Hall of the Pumping Association says that the plant will be installed by the middle of October, and that the electric hoist will then be substituted for steam.

At the Savage mine, on the 425 level (from the Gould & Curry tunnel), the past week was occupied in putting in a waste chute in the upraise from the north drift from No. 2 east crosscut.

WASHOE COUNTY.

There are said to be over 300 men now at Donnelly mountain, the new mining camp in the northern end of the county.

Nevada Bell Con. M. & R. Co. has incorporated at Reno.

WHITE PINE COUNTY.

Manager J. A. Yerington of the McKinley mines, Ely, says an additional hoisting plant will be installed and a reduction plant for converting the ore.

NEW MEXICO.

GRANT COUNTY.

The recent purchase of the Hanover group of iron mines near Silver City by Phelps, Dodge & Co. starts a report of their proposed erection of a smelting plant at Deming, which would be encouraging news for many of the small mining properties surrounding Deming for 100 miles, which as a rule are known as siliceous ores that will not stand shipment to El Paso.

SANTA FE COUNTY.

At Cerillos the Con. M. & S. Co. is making a final survey for a railroad from the smelter to the properties 4 miles distant. The line will require 12 miles of track and will cost \$30,000. The company is laying the foundation for a concentrating plant which is expected to be completed Jan. 1. The company miners are working the Tom Paine.

The Gibson Dev. Co. has had men constantly at work for more than a year prospecting and developing the Erie and Buckeye groups. Some high-grade silver-lead ore has been taken out in doing such work. On another of their groups, the Dreamer, they have one shaft 160 feet down, and another 55 feet. The ore is chloride in character and carries 100 ounces silver. The Bottom Dollar, Nick of Time, Humming Bird, Aztec, Hondo, No. 4 and other properties are working full force with a view of being able to supply ore to the smelter and concentrating plants.

There are 200 individual owners of claims in the Cerillos district who for many years have kept up their assessment work and who expect to share in the benefits to be derived from present improvements and development.

OREGON.

BAKER COUNTY.

At Sumpter Everett Brown, manager California and Cracker-Oregon mines, has a 10-stamp mill on the Cracker-Oregon

and concentrating plant on the California. A strike is reported made in the Little Emma mine, Virtue district, 6 miles from Baker City, 200 feet below the surface, 550 feet in the tunnel. It is a 5-foot ledge; ore averages \$15. All the ore is free milling. The property is owned by W. L. Vinson.

Near Sumpter, General Manager J. H. Pomeroy, on John Day river, has given his dredger a preliminary run. It cost \$130,000, the first plant of the kind to be erected on the John Day side of the Blue mountains, the second in eastern Oregon. The capacity of the dredger is theoretically 2000 cubic yards, although in making general averages, which must include necessary stops, the daily capacity is reduced. A large placer area is owned by the company, which will be worked.

Near Sumpter, J. K. Fawcett of the Payco, has bought the Little Giant mill machinery and building to haul it to his Greenhorn mine.

A. Baring of London, owner of the North Pole, was in Sumpter last week on a visit to the mine.

Manager McPhoe of the Golden Wizard is unwatering. Sinking will be continued.

The Black Pine placer mine is on East Ten Cent creek, 3 miles from Lawton; has 1400 feet of pressure pipe, two dams and other equipment. A survey is being made for a ditch to increase the present force of 100 inches to 300, with a better head; 2½ miles in length, by 50 to 100 feet wide, is available for work. On this the gravel bed is between 8 and 15 feet.

A preliminary run of the big dredger on the John Day was made during the week to test the machinery. The run was short and resulted in revealing few weaknesses.

T. H. Barbee of the Crown Point is installing a three-drill air compressor.

JACKSON COUNTY.

At the Sterling placer mine two giants are operated; twenty-five men have been employed but hydraulic mining will probably be suspended next week for the clean-up. A strip of conglomerate about 20 feet wide next to the bedrock, parallel with the old channel and near the center, requires blasting before the monitors are turned on it. After a cannonade of dynamite cartridges on this cement bed, the streams of water do the remainder of the work effectively.

Robert Bond, near Jacksonville, has developed by tunnel levels ground favoring that kind of exploration. A 5-stamp mill is in operation on the property.

SOUTH DAKOTA.

LAWRENCE COUNTY.

The stamp mill of the Boston-South Dakota M. Co., in Blacktail gulch, is in operation. It has forty stamps; twenty of them are running at present. The ore is a conglomerate, carrying from \$3 to \$5 a ton in free gold and about the same amount in concentrates. The company will add concentrating machinery. T. Corkhill is superintendent.

In the vicinity of Roubaux, formerly Perry, companies are working and more men drawing salaries than ever before. The Clover Leaf M. Co. is running thirty stamps on the Uncle Sam and before the year closes will have sixty stamps dropping. The company is building a flume to take water out of Elk creek. The Anaconda M. Co. is sinking a shaft on the Nelson ground and will crosscut to the east.

PENNINGTON COUNTY.

Keystone thinks it is probable that the mill of the Holy Terror Co. will have some more of its stamps in operation next month. It is asserted that the other fifteen are soon to be let down, and the ten stamps of the Holy Terror mill may also be started before long. The company has been blocking out a large amount of ore lately, and it is showing an excellent grade. There are experiments still under way with a view to ascertaining the best method of treating the tailings of the mill.

The Tycoon M. Co. is continuing the tunnel designed to make it more convenient to convey ore from the mine to the stamp mill. Regular clean-ups are being made at the 10-stamp mill.

The Horseshoe M. Co. may buy the National smelter at Rapid City. If it goes the cyanide plant may not be built, although the Horseshoe people would continue the present cyanide mill at Pluma, by enlarging it to 200 tons capacity. The Rapid City smelter has an ore capacity of 300 tons per day.

YANKTON COUNTY.

(Special Correspondence).—The Hidden Fortune M. Co. reports that they have opened a body of ore in the 120-foot crosscut. They have not yet struck the foot-wall. The ore will average \$6 per ton.

Gayville, Aug. 8.

UTAH.

BEAVER COUNTY.

The Beaver Con. M. Co. has incorpo-

rated at Milford; J. J. Trenam, president; J. J. Corum, vice-president; E. H. Jacobs, treasurer; B. L. Corum, secretary.

JUAB COUNTY.

At Eureka Superintendent Bridges of the St. Louis-Eureka M. Co. has a lease and bond upon the old West Cable ground which adjoins his company on the north. It is his intention to run a drift from the 550-foot level of the West Cable into his company's territory, giving a depth of 750 feet. The amount of the lease and bond is said to be \$20,000, the lease running five years.

Resumption of work at the Centennial-Eureka mine, Eureka, is projected. It is the local belief that the entire force of 200 men will be re-employed.

The Eureka Hill M. Co. now employs forty miners.

Superintendent J. C. Sullivan has the shaft of the Raymond M. Co. down 1100 feet and says that the work of sinking will be continued, possibly until a depth of 2000 feet has been attained. When the 1300 level is reached drifting will be commenced.

PIUTE COUNTY.

Manager Rader of the Annie Laurie mines and mill at Gold Mountain, Kimberly, expects to tap the gold-bearing channel at a vertical depth of 460 feet below the avenue above, penetrating the zone a distance of 3000 feet.

SALT LAKE COUNTY.

Thornton & Lloyd have a \$15,000 option and a year's time on the Ravine group at Alta, adjoining the Centennial Emma.

SUMMIT COUNTY.

Manager A. H. Mayne of the Minola properties, Park City, expects that the main contact will be reached at a depth of 130 feet below the tunnel level. The Minola Co.'s territory stretches along the zone north of the Silver King, embracing 157 acres.

TOOELE COUNTY.

The cyanide plants of Mercur, Utah, have treated ores profitably which ran as low as \$2.80 per ton, when handled in large tonnages. The bulk of those ores have thus far been of the oxidized class, composed of siliceous lime, clays, shales, porphyry and talc, which offered little obstacle to cyanide work when leached in coarse particles. At greater depth a portion of the ore contains such base elements as arsenic and antimony, which requires roasting before leaching. In the vernacular of that camp the first class named, which requires no roasting, is called "free milling."

WASHINGTON COUNTY.

Grant Snyder, manager of the Dixie at St. George, has on the 625-foot level a width of 40 feet, ore going from 17% to 20% copper. The main shaft is down 675 feet. A 10-mile road between the mines and the site for the new smelter has been completed.

WASHINGTON.

DOUGLAS COUNTY.

The Columbia Tram Co. proposes to construct and operate a 2-mile aerial tramway on the Columbia river, near Waterville.

FERRY COUNTY.

At the Mountain Lion mill, near Republic, in six months, 11,959 tons gave a gross value, \$129,127.07; average value per ton, \$10.80; highest value in gold, \$12.39; highest value in silver, \$1.87; lowest value in gold, \$7.49; lowest value in silver, \$1.38; milling cost per ton, \$3.73; average saving of Mountain Lion mill, 54.9%; highest percentage, 61.9; lowest percentage, 39.

The Ohio G. M. Co. incorporated last week in Spokane to operate an extension of the Tom Thumb at Republic.

OKANOGAN COUNTY.

Near Loomis, after a temporary shut down of three weeks, the power drills at the Six Eagles mine are driving at a rate of 3 feet per day the tunnel to cut the ledges on the several claims of the group.

The Co-operative Mining Syndicate of Elma will increase their force and drive a working tunnel. J. Kent will superintend the work.

STEVENS COUNTY.

The Old Dominion M. & M. Co.'s property near Colville is leased for three years to W. F. Kyle of Minneapolis, Minn. The ore contains chlorite and bromide of silver, galena, staphanite and fahlerz, with gangue of mixed quartz and lime. The total work on combined properties is 11,625 feet. The vertical depth of the tunnel now in 3000 feet is about 800 feet, and on the incline of the ore plane 1200 feet. C. G. Carruthers is superintendent and expects to begin active work about September 1.

YAKIMA COUNTY.

Near North Yakima, the Elizabeth G. H. M. Co. reports a vein measuring 7½ feet, on ore that assays \$147 in gold, silver and copper per ton. Twelve men are at

work opening the State road to the district. The mines are 70 miles from North Yakima and 20 miles from a wagon road.

WYOMING.

CARBON COUNTY.

Near Grand Encampment, the Grand Republic M. Co. are at work on their claims. S. Fields, formerly foreman Grand Encampment Smelter, is superintendent.

Grand Encampment reports that the sunken cavern, known as the Princess copper mine, has been sold to C. Fishback of Rawlins. The ore goes \$11 gold to the ton and some copper.

At Grand Encampment the North American Copper Co., which recently bought a number of mines in that section and which proposes to build railroads, electric light plant, etc., has commenced work on the 1000 H. P. electrical plant. A camp has been established 3 miles up the south fork of the Encampment river, and men are building a wagon road to a point 4 miles from Encampment, where a dam will be constructed. Water will be piped to the smelting plant and concentrator. The dam will be 33 feet high.

FOREIGN.

BRITISH COLUMBIA.

The Mines Exchange, Ltd., Nelson, reports that Fish Creek, on the Lardeau, at present is the liveliest camp in the district. The Camborne group is owned by the Northwestern Development Syndicate, Ltd., the Eva group by the Imperial Development Syndicate, Ltd., and the Oyster group by Messrs. Poole & Young and associates. On the Camborne group the company have an electric power plant and three electric drills are used to develop the property. The company is furnishing electric lights for the camp and mine workings, wires being connected with the townsite of Goldfields. It is the intention to operate an electric car line for passengers and freight between Comaplix, the head of navigation on Arrow lake for the camp, and Goldfields. Machinery for a 10-stamp mill and 5000 feet aerial tram has been shipped. A shipment of twelve tons made to the Granite mill, 5 miles west of Nelson, gave results as follows:

Feeder sample assayed, per ton.	\$ 44.00
Recov'd by amalgamation, per ton.	33.07
Recov'd by concentration, per ton.	1.80
Value of concentrates	207.20
Gold bullion recovered, ounces.	25.65
Percentage of total values saved by amalgamation.	82.7
Percentage of total values saved by concentration.	4.7
Total recovery, per cent.	87.4

Development work on the Camborne is under the superintendence of H. Z. Brock.

On the Eva group development has been carried on for two years, resulting in over 2000 feet of underground workings. The lead is from 100 to 150 feet wide. The ore shoots occur on either wall, with numerous cross fissures from wall to wall, which carry ore.

The Wide West, Beatrice and Iron Dollar groups, in this district, are being opened up. The formation throughout is a mica schist, with frequent intrusions of porphyry dikes.

Because of the adoption of oil for fuel in California the demand for coal from the Nanaimo mines has fallen to a low figure. Up to this year there has been a large fleet employed in the transportation of coal from British Columbia to San Francisco, but this has of late been decreasing. The New Vancouver Coal Co. at Nanaimo announces that the mines will be shut down and frankly advises the men to look for other employment.

At Rossland the main shaft of the Le Roi mine is to be sunk to the 1400-foot level.

H. B. Jackson, manager Contact mines, proposes to put in extensive machinery.

A. G. King will put in a concentrating plant at the Bird mine, Deer Park.

J. C. Ryan of Kaslo, who has been working and managing the Soho group, says that the property will from now on be operated by the Soho M. Con. Co., and that extensive work will be begun. It is the intention of the management to put in a \$12,000 compressor plant. The ore is silver-lead.

The Second Relief mine, Ymir, has started its mill and is daily treating thirty tons of ore, average value \$11. The plant was run several months ago, but it was found that the tailings carried away \$4.50 per ton. A cyanide plant was built in connection with the stamp mill and it is expected to save 80% of the gold in the tailings at a cost of 76 cents per ton. The mill and the mine together employ about thirty men; F. Nettleton superintendent.

MEXICO.

CHIHUAHUA.

A gasoline locomotive goes to a mine at Batopilas, 180 miles from the Mexican

Central Railway across the Chihuahuas mountains. None of its parts weigh more than 250 pounds, as the whole engine has to be carried from the railway to its destination on the backs of burros. It will run in a tunnel 5 feet wide and 6 feet high, and will take the place of sixty burros, which now pull the cars of ore from the mine. As the tunnel is small and its length great, the locomotive had to be constructed so that no fumes escaped. To accomplish this, the carbonic oxide gas is passed through scrubbers at a gas works. It is claimed that the process will effectively prevent fumes from escaping into the tunnel and that the combustion will be perfect.

The Rosario mine, at Guadalupe y Calvo, is sold to Montana men; the price is said to be \$1,000,000. A. W. Warwick of Denver, Colo., is examining the property.

SONORA.

A group of copper mines in Sonora have been acquired by S. M. McCowan, W. C. Foster and W. E. Defty of Prescott and J. Henderson of Nogales, Ariz. The property is known as La Gran Providora de Cebra. The company will begin operations Sept. 1.

NEW ZEALAND.

There is a mill containing 330 stamps on the Waihi, its crushing equipment being third in size on earth, being next after the Homestake Co. of South Dakota, and the Treadwell property of Alaska. The Waihi has been in operation fifteen years and to May of this year had produced \$10,663,350 in gold. The deepest workings are 643 feet. A recent estimate of the ore in sight placed the total at 628,595 tons. Last year 290 stamps crushed 159,325 tons ore.

NICARAGUA.

W. M. Bluett has returned to California after eleven years' residence on the Mosquito coast, Nicaragua, near Bluefields. With his partner, J. B. Smith of South Dakota, he has several ledges, one 33 feet, another 16 feet, another one 18 feet. On one of these ledges in thirty days with the Huntington 3-foot mill he says they took out 1000 ounces of gold. The 60-foot ledge will average from \$10 to \$12 a ton. They have ample water power and are preparing to put in a 20-stamp quartz mill. The mineral wealth of that country, Mr. Bluett tells the Oakland Enquirer, lies in the large porphyry belts with big leads. The principal capital invested in the development of mines there is local—being that of business men and merchants of the coast, very little outside capital being put into the country. The local business men find that it is a paying investment and that there is a double advantage in the business which the mines afford to the coast towns. The officers of the mining companies receive salaries ranging from \$150 to \$200 a month, but most of the labor is done by peons, who receive \$2 native money and board. This means that their wages are about 50 cents of United States coin, and it costs from 25 to 30 cents native money to feed them. The mine in which Mr. Bluett is interested employs from twenty-five to thirty men regularly. Most of the supplies for the men come from New Orleans and New York, although a large portion of what is consumed is produced on the plantations adjacent to the mines. The climate is equitable and healthful, Mr. Bluett stating that in the eleven years of his residence there he has not been sick more than four days. The water is good and the heat is not such as to interfere with ordinary pursuits. The political disturbances of the country have little effect upon the progress of mining, and there has been no interruption by reason of the unsettled state of affairs at any time since Mr. Bluett has resided in Nicaragua. Mr. Bluett expects to return to Nicaragua when the new plant at the Lone Star mine will have been completed.

PERU.

F. Klepetko, late of Butte, Mont., has taken charge of the New York office of the company that proposes to make Peruvian copper a prominent factor in the world's copper production. Engineers are now laying out a line for the extension of the Oroya Railway to Cerro de Pasco. The money is being furnished by J. B. Haggin of New York and associates. Three millions of dollars already have been expended in buying up claims, and the Americans now own four-fifths of the entire region. The railroad from Oroya to the mines will cover a distance of 80 miles, and will cost about \$2,000,000. The mines of Cerro de Pasco have been famous as silver, but not as copper producers, for more than two centuries and a half. The official records account for an annual average output of 1,600,000 ounces, making the quantity up to the present time 435,200,000 ounces. For years copper has been known to exist in the Cerro de Pasco district. The miners were con-

tinually coming across it in the course of their extensive workings, and it was considered by them as the only great drawback to the region. In 1899 the attention of Europeans was attracted to the possibility of the Cerro de Pasco district, and T. A. Bennett, an English mining engineer, was sent to Peru to make an examination of the property for the London Exploration Co., Werner, Beit & Co. Mr. Bennett made a thorough examination of the whole district, and based his report upon the conviction that the Cerro de Pasco is the greatest single deposit of copper known. J. B. Haggin, who has been for many years largely interested in copper and copper mines, having had the Cerro de Pasco region brought to his attention, sent A. W. McCune and J. MacFarlane from Salt Lake, both of whom had been associated with him, to Peru, to visit the Cerro de Pasco mines and report to him thereon. They did so, and he was so well pleased with the possibilities described by them that he determined to purchase the properties. Mr. McCune came to Peru to negotiate the purchase of the properties. He and Mr. MacFarlane resided in Lima in July of last year and immediately began buying up the properties in the Cerro de Pasco region. Between 200 and 300 claims have come into the possession of Mr. Haggin, representing about four-fifths of the copper-bearing belt. The claim in Peru under the old Spanish law was 60 by 30 varas (a vara being 33 inches). The ore deposits or veins are about 2 miles long, and from about 1 mile of this ore has been taken and shipped. Having secured the mines, Mr. Haggin's representatives began negotiations with Mr. Thorndike for his railroad concession, and this was secured only a short time ago. The railroad is to be 4 feet 3½ inch gauge, will run northward, passing over the summit of one of the ridges of the Andes at an elevation of 14,300 feet. No great difficulties, it is asserted, will be encountered in building the road. Two small pieces will be 3% grade, but the average grade will be 1½%. The Oroya Railroad leaves the port of Callao at 9 feet above sea level, and at a distance of 106 kilos surmounts an elevation of 15,665 feet.

SOUTH AFRICA.

Consular Agent W. D. Gordon of Johannesburg, under date of June 28, writes that he has been asked to secure data in regard to drilling outfits, suitable for prospecting alluvial wash at a depth of 25 to 30 feet, and a core 6 inches or more in diameter is desired.

Johannesburg believes that there is a continuation of the main reef of the Witwatersrand gold field 35 miles on a line south by east of the Nigel mine to a point near Greylingstad. The Coronation Syndicate has secured the area. Prospecting parties are now engaged at different points.

W. S. Caine, Member of Parliament, London, S. W., England, writes in reply to a letter from W. H. Cowling of Gilpin county, Colorado, asking for information concerning privileges and restrictions granted and demanded from all parties intending to go to South Africa, to work in the mines at that place. For some time past no one was allowed a permit to go to that part of the country until they possessed £100, so that in case they were unable to get work they would not be a charge on the Government, and as so many men were going to that country looking for work, who had barely enough money to land them, some restrictions had to be made, which resulted in an order being issued that no permits would be granted unless it was shown that the applicant had the amount of money required. Mr. Caine says: "That I might be quite sure that I had the latest information, I went to the South African permit office and saw the chief, showing him your letter. The £100 is quite unnecessary now, and if you can show proper evidence that you have been engaged by the Crown Reef Gold Mines, or any other, you will have no difficulty in proceeding to South Africa. But for some time to come no permits whatever will be given to persons who are simply going out to look for work, unless they can produce £100. There is no need for you to come to England to get the permit. They are now given by the British Consul at New York and the British Consul at San Francisco. All you need do is to send the letter informing you of your engagement in South Africa to the New York Consul, making formal application for a permit. He will then send you a permit, and if you can get a steamer you can proceed direct to the Cape from New York or any other port in the States. If, however, you intend to go to South Africa via this country, and are coming home to see your people before going out, I should advise you to get your permit here, as it will be simpler and easier."

The total gold output of the Transvaal mines for July, 1902, was 155,000 ounces,

an increase of 129,041 ounces over the same month last year. From January 1 to July 31, 1902, the total output is returned at 811,842 ounces, against 53,216 ounces in the first six months of 1901, 251,801 ounces in the same months of 1900 and 3,042,339 ounces in the first half of 1899.

THE KLONDIKE.

Dawson to the 11th inst. reports that what is calculated as the best discovery of gold since the days of the El Dorado, was recorded that day on a tributary to Sixty-mile river, 30 miles back from the Yukon. War is on between the up river boats, and the lowest rates for the year are now announced, \$20 first class and \$10 second class, to White Horse. Over \$750,000 in bullion left there last week. The total shipments for the present season since the opening of navigation, as taken from the comptroller's books, is \$6,500,000. This is the first exact report given by the comptroller.

A fire at Forty Mile, August 5, nearly wiped out the town. The entire set of warehouses of the N. A. T. & T. Co. were destroyed. Loss \$40,000.

Personal.

FRANZ CAZIN of Denver, Colo., is in Rossland, B. C.

G. TETRO is superintendent Albion mine, Alta, Utah.

J. B. MAYO is manager Old Reliable M. Co., Golden, N. M.

STUART EDGAR is manager North Fork M. Co., Lake, Wyo.

V. M. CLEMENT has returned to Salt Lake, Utah, from Mexico.

G. W. CRAWFORD is manager Pride M. Co., Montezuma, Colorado.

DON MAGUIRE of Utah is examining California mining property.

A. B. LEWIS is general manager Majestic M. Co., Milford, Utah.

FRANK LEONARD of Alma is examining mines in Boulder county, Colo.

W. C. WRISBERG is manager Bon Homme mine, Lake City, Colo.

R. B. SYMINGTON is examining mining properties at Whatcom, Wash.

A. H. BROWN, manager Trinity, Cal., Copper Co., is in San Francisco.

H. A. KELLER has returned to San Francisco from Valdez, Alaska.

W. H. RADFORD has returned to San Francisco from Cripple Creek, Colo.

CURTIS H. LINDLEY has returned to San Francisco from Grass Valley, Cal.

W. C. HOWARD is superintendent Golden Eagle mine, Hayden Hill, Cal.

F. J. SOLINSKY has been elected president Houghton G. M. Co., Altaville, Cal.

W. C. MOSHER of Denver is in Park county, Colo., looking after mining interests.

GEO. B. ST. CLAIR is superintendent the New Philadelphia Co., Georgetown, Colo.

JAMES MCKINTY, foreman Con. Virginia mine, Virginia, Nev., is in San Francisco.

C. W. GOODALE is announced in Montana as probable superintendent Washoe smelter.

WILLIAM GWYNN of Mexico is doing placer mining at Breckenridge, Colo., this summer.

H. A. SUMNER has been appointed chief engineer Denver, Northwestern & Pacific Railroad.

CHAS. GRACY of Arizona is examining mining property near Pioneer, Amador county, Cal.

E. EVERSON is superintendent D. U. Jones mine, Quartz Valley, Siskiyou county, Cal.

E. KEINZLE is superintendent of the Dunkirk G. & S. M. Co., Slate creek, Prescott, Ariz.

NEWTON DUNYON has been appointed assistant superintendent of the Daly-West, Park City, Utah.

G. M. HYAMS is announced as the new manager Amalgamated Copper properties, Butte, Mont.

G. W. INGALLS is at the Ferry Building, San Francisco, in charge of the Nevada mining exhibit.

H. C. BRIGHAM is now superintending the Keystone placer operations, San Miguel county, Colo.

F. L. BOSQUI, late superintendent of the Smuggler-Union Co., Telluride, Colo., is now at Ross, Mont.

A. N. BUTTS, a mining man of Angels, Cal., is examining mining property in the San Juan country, Colo.

J. M. MORRISON, manager of the Richfield M. Co., has returned to Ures, Mexico, from Washington, D. C.

C. M. FUELLER, of Denver, Colo., is

taking a trip through South Dakota, and also Chicago and Milwaukee.

PAUL LIPPENS, a Belgian mining engineer, is visiting California mining properties on a tour of observation.

W. A. CLARK is in San Francisco. He will visit the mines at Jerome, Ariz., and return to Butte, Mont., Oct. 1.

F. M. DOWNER of Longmont is now superintendent of Denver mint and J. M. Milson of Canyon City, melter.

GENERAL MANAGER E. V. ORFORD of the De Lamar mines, De Lamar, Idaho, has returned there from Silver City.

THE Crown Prince of Siam will make a tour of all Western metal mines of this country next October and November.

C. H. WHITE, professor geology and mineralogy of Yale College, is at Mercur, Utah, to investigate cyaniding work.

R. R. LESLIE, late shift boss, is now superintendent Le Roi mine, Rossland, B. C., F. Whitman underground foreman.

T. J. HOOVER, late assayer Keystone mine, Amador Co., Cal., has opened a mining engineer's office at San Francisco.

N. C. BANKS of Pittsburg, Pa., who has charge of the mining department of the Westinghouse Co., is in Salt Lake City, Utah.

S. H. C. MINER, J. P. GRAVES AND A. C. FLUMERFELT of the Granby M. & S. Co. are inspecting Republic, Wash., mines.

J. O. ROUNDTREE has returned to Baker City, Or., and taken charge of the Baker City Sampling Works as manager for Bela Kadish.

SAMUEL BUTLER, of Grass Valley, Cal., has charge of the Nevada county, Cal., mining exhibit, Ferry Building, San Francisco.

J. F. ARMSTRONG of El Dorado county, Cal., has been appointed register U. S. Land Office, Sacramento, Cal., to succeed the late T. Fraser.

FRANK GARRISON has returned to Leadville, Colo., from Nova Scotia, where he has been examining mining properties for Boston parties.

COUNT J. DE GABRIAC of Paris, France, one of the directors of the La Grange, Cal., H. G. M. Co., who has been visiting the mine, has returned home.

J. M. HYDE has resigned as curator mining exhibit and museum of the California Mining Bureau, San Francisco, Cal., and is succeeded by C. W. Cline.

C. E. GRUNSKY, of the Board of Public Works, has returned to San Francisco from an extended observation of proposed public water supply in the California Sierras.

ROBERT MIEN, secretary Alaska-Juneau M. Co., is in Juneau. Mr. Bradley will have charge of the outlining of plans for the development of the Alaska-Juneau property.

C. M. HAMPSON has returned to Denver, Colo., from South Dakota, where he has been superintending the erection of a mill. He expects to return to South Dakota shortly.

W. LINDGREN, of the U. S. Geological Survey, is at work on a monograph soon to be issued by the survey, entitled "Neocene Rivers of the Sierra Nevada." It will contain the latest observations on the course of ancient river beds in that range.

E. W. KING, superintendent mines and mill Great Northern M. Co., Fergus county, Mont., has tendered his resignation, but the company has asked him to remain until the property either changes hands or the bond on the property expires. Mr. King desires to devote his attention to some of his own mines.

E. L. BOSQUI of San Francisco has gone to Point Barrow, where he will take native canoes and proceed up the Colville river, with supplies for three years. He has been appointed commissioner to the farthest north land yet explored for gold—the basins of the Colville and Iktpkump rivers, which empty into the Arctic ocean northeast of Point Barrow. Part of it lies in the second judicial district and part in the third, and Mr. Bosqui has commission from Judges Moore and Wickersham.

Commercial Paragraphs.

B. C. VAN EMON, formerly manager of the Electrical Engineering Co., has opened an office at 137 First street, San Francisco, and is equipped to build any and all kinds of electric and hydraulic elevators, motors, mining machinery, etc.

FAIRBANKS, MORSE & Co., through their Denver, Colo., house, report the following sales of machinery: Two carloads gasoline engines, for irrigating purposes, to Pecos Valley, N. M.; one 100-ton concentrating plant, using Standard concentrators and Sturtevant crushing machinery, for the Emmet M. Co., Boise,

Idaho; one 100-ton concentrating plant, using Standard concentrators and Sturtevant crushing machinery, to the Henson Creek Lead M. Co., Lake City, Colo.; one carload gasoline pumping plants, for Deming, N. M.; sampling works plant, operated by gasoline engine, for the Olden-Meyers Sampling Co., Black Hawk, Colo.; two 500,000-gallon duplex steam pumps, for Durango, Colo.

THE Colorado Iron Works, Denver, Colo., report the following sales: Twelve 31 cubic foot, self-dumping and righting slag trucks, for Cananea Con. Copper Co., Cananea, Mexico; one steam hoisting plant, with two double-deck cages and cage cars, for New York & Nevada Copper Co., Ely, Nev.; equipment complete for one silver-lead smelting plant, with blast furnace 36"x60", all to be made in sections for mule-back transportation, for Vicente Ortiz, City of Mexico; one rubber-top Bartlett table, for Mount Washington Copper Co., Maryland; one carload cast iron water jackets, for Compania Metalurgica Mexicana, San Luis Potosi, Mexico; one carload cast iron water jackets, for American S. & R. Co., East Helena plant; two iron-top Bartlett tables, for the Federal Lead Co., Flat River, Mo.; one set 54"x8" high-speed rolls, for Horse-shoe M. Co., Deadwood, South Dakota.

Catalogues Received.

"Section 2, Boilers and Sheet Metal Work: Mining Machinery," issued by the Holthoff Machinery Co., Cudahy, Milwaukee county, Wis., illustrates sundry standard hoilers, with appurtenances, copper converters, cyanide tanks, ore buckets, and a host of mining devices and appliances.

Under this head may be mentioned a series of leaflets from the American Engineering Works, 204 Dearborn street, Chicago, describing and illustrating in detail sundry appliances and devices supplied by that firm. They are of uniform size, twenty in number, handily arranged for filing and convenient for ready reference. The entire series is being constantly added to and constitutes an up-to-date description of many modern mining appliances.

The American Steel & Wire Co., Chicago, New York, Denver, San Francisco and Worcester, has issued a fine book of reference tables of wires for electrical purposes, comprising a table of dimensions and weights of pure copper wire, a table of comparative sizes, wire gauge in decimals, in which comparisons of the pounds per 1000 feet of copper wire of the same size numbers of different gauges are given, comparisons of the pounds per mille of copper wire of the same size-number of different gauges, table of resistance of pure annealed copper wire and standard copper conductors, table of sizes, weights and length of iron and steel. The rail bonds of the company's manufacture are described and illustrated, and several pages devoted to a list of the products made by this company are not the least interesting features of the book.

"New York Rapid Transit Tunnel:" a well printed pamphlet issued by the Rand Drill Co., 128 Broadway, New York City, essentially a description of the construction of this great engineering undertaking. It is published to illustrate the uses and applications of Rand drills and air compressors in centralized air power plants. The need of such a means of transit is shown in the rapid growth of the city in a short time, and the previous ineffectual attempts to handle the proportionate increase of travel. A brief history of legislation and attempts to start the enterprise is concluded by a statement of the award of a \$35,000,000 contract. The numerous difficulties of construction and their solution form the bulk of the description. Geological conditions, drainage and plying obstacles, and the great difficulties in passing under the large buildings and traffic-bearing thoroughfares are described, and the overcoming of all obstacles of engineering endeavor are illustrated. The whole is a good example of the marvels of present engineering skill, and is superbly illustrated. It is a good advertisement for the Rand Drill Co. of 128 Broadway, New York City, but apart from that is a most interesting account of a great work now in progress.

Obituary.

JAS. SPIERS, president Fulton Engineering & Shipbuilding Works, died at his residence, San Francisco, Cal., on the 13th inst., in the 67th year of his age. Deceased was a native of Scotland and was prominent in his business in San Francisco for many years. He was of a fine type of manhood and did much to advance the material interests of the State and city in which he so long bore honorable part.

MINING AND SCIENTIFIC PRESS

Whole No. 2196.—VOLUME LXXXV.
Number 8.

SAN FRANCISCO, CAL., SATURDAY, AUGUST 23, 1902.

THREE DOLLARS PER ANNUM.
Single Copies, Ten Cents.

Made From Air.

The latest achievement of science is the production of nitric acid from the atmosphere. This has long been a laboratory process, but is now a successfully solved problem on a commercial basis. It is a new triumph of electro-chemistry. The Atmospheric Products Co., at Niagara Falls, N. Y., has a plant wherein atmospheric air is decomposed and the nitrogen therein is fixed. The apparatus consists of a nitrifying chamber, which is a vertical cylinder provided with arrangements for maintaining a large number of electric arcs; a motor for causing the shaft in the nitrifier to rotate in order to produce the arcs; a motor-actuated blower for forcing a current of air through the nitrifier; a chamber in which the reaction between the gases is completed; an absorption tower, which extracts from the air coming from the nitrifier, and the chamber, the oxides of nitrogen produced by the reaction, and a 10,000-volt dynamo driven by a 2000-volt motor.

Prof. Chandler of Columbia University, N. Y., Lord Kelvin, Prof. Christy, dean of the mining college of the University of California, have personally examined the process and conducted a series of experiments that, in their judgment, demonstrate the entire success of the operation.

The former says: "The absorption tower was thoroughly washed out and the dynamo was set in motion. A solution of caustic soda was allowed to trickle through the absorption tower, and the energy employed in producing the arcs was carefully measured. The experiment was continued for 2 hours 2½ minutes, the energy consumed during this period being 12,500 watt hours, equivalent to 12.5 kilowatt hours. The product was carefully collected, measured and analyzed, in order to ascertain the amount of nitric acid or its equivalent produced during the experiment. It was found that the product, which actually consisted of nitrate and nitrite of soda, contained the equivalent of 1½ pounds of 100% nitric acid, equivalent to 1785 pounds of 70% nitric acid. (A common commercial strength of this acid.) Twelve and five-tenths kilowatt hours of energy produced, therefore, 1785 pounds of 70% acid. One kilowatt hour, therefore, produced 0.143 pound. One kilowatt per year would, therefore, produce 1253.5 pounds of 70% acid. Assuming the cost of energy to be \$20 per year per kilowatt, the expense for energy would be a little less than 1.6 cent per pound of 70% acid. The current price of this acid at the present time is 5 cents per pound. At the rate at which the acid was produced in this experiment the yield of this unit of apparatus would be 8766 pounds of 70% acid per annum."

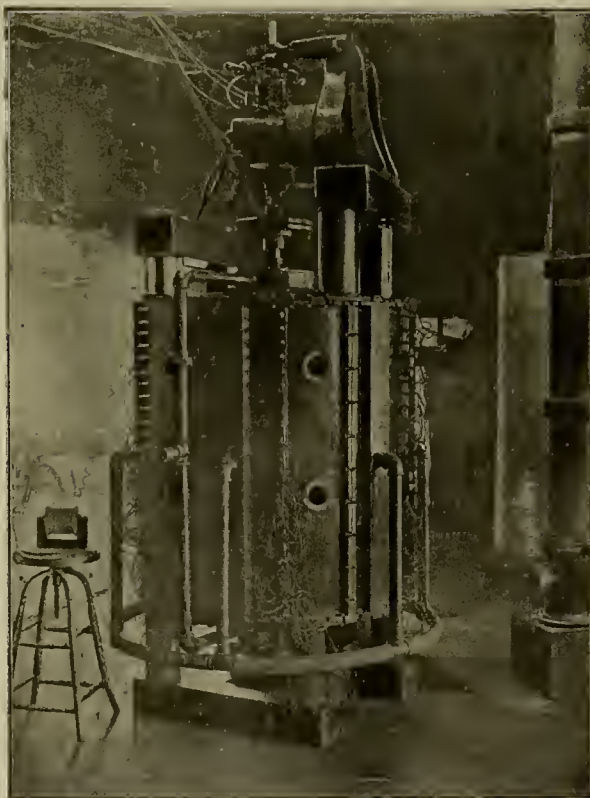
The product of the process can be marketed in a myriad of forms to meet a great number of demands. There can be commercially produced: Nitric acid, nitric acid gas for the sulphuric acid chambers; nitrite of soda, potassa, lime, strontia, baryta, etc.; nitrates of soda, or lime and other valuable compounds.

Herewith is presented a view of the nitrifying chamber, which is a cast-iron tank in which revolves a vertical shaft at the rate of 300 revolutions per minute. One hundred and forty-four straight, platinum-tipped wires are contained on this shaft. When the shaft so speedily revolves these wires are caused to stand out straight by the resultant centrifugal force. There are 144 other wires set into the sides of the tank in six upright rows, these coming from the generator. Each of these latter is furnished with an inductance coil after they branch off from the main circuit, so that there are produced as many independent electric arcs. These arcs are formed by the revolving wires which do not come just directly

one above the other in regular rows upon the shaft, each one being set a little to the rear of the one immediately above it all the way from the top to the bottom of the shaft, thus forming spirals of the wire tips. The arcs begin at the top of each row of wires, then run from wire to wire down to the bottom, and then begin again at the top, without any interval or missing a single arc formation, as the wire at the top rotates exactly opposite to the corresponding row of fixed wires. These last-mentioned wires are likewise



Arc Dynamo Used to Operate the Nitrifier.



Nitrifying Chamber, Showing Loose Ends of the Inductances. Cooling Tower is Seen at Right.

platinum-tipped. A direct electric current is used, being supplied at a 10,000-volt pressure. The arcs assume a sickle shape as made, and vary in length from 6 to 8 inches. The tank is 3 feet diameter, 6 feet high. A 2000 H. P. motor operates the apparatus.

There is an air pocket in front of each line of points in the interior of the tank, each of which catch the air as it is decomposed by the electric arcs, and through pipes this air with its load of newly formed acids is carried down to a circular tube at the bottom of the tank, and thence to the absorption tower,

where a shower of water takes up the acids and carries them off to be subsequently recovered. Around the bearings of the revolving shaft at the top and bottom of the tank is the intake for the air, this being suitably arranged with the dual purpose of keeping the bearings cool and give free, quick circulation of the air to the arcs.

In this apparatus it is to be noted that the smaller the current used in each arc the greater the efficiency up to .001 of an ampere. At this point the arc breaks. These arcs are not disruptive, being steady and uniform in practice. They use from .005 to .002 of an ampere, this intensity producing the best efficiency. In the picture which shows the chamber, noted by the Electrical Age, there are broad trays of inductance coils from which the wires are led into the interior of the chamber. The plant which is here portrayed is the first installation. These inductances have not been arranged as they will be when the completed plant is arranged for commercial operation. They will then be placed under the floor and entirely concealed. The apparatus, it is asserted, converts about 2½% of the air forced into the chamber into acid, producing nitric acid.

The commercial aspect of the matter is of importance, and is calculated to attract the attention of manufacturers and mining men. As is well known, there is an ever-widening market for the various compounds of nitrogen, owing to the fact that the products do not depend upon any one industry for consumption, but enter directly or indirectly into a

great many of the manufacturing arts. Nitric acid is probably first in importance, as it enters into the manufacture of many widely consumed products. Dependent upon it are many coal tar products and also the high explosives, such as nitro-glycerine, gun cotton, dynamite and the large variety of smokeless powders. It lies at the base of the celluloid industry; it is used in the manufacture of the various metallic nitrates, such as nitrate of silver, so important to photography and kindred arts.

The total annual consumption of nitric acid in the United States exceeds 100,000 tons. The consumption of nitrate of potassium is large. The imports to the United States last year amounted to 21,000 tons. Nitrite of sodium is used in the color industry to the extent of about 20,000 tons per annum. Nitrate of sodium and nitrate of calcium are of the utmost importance to the fertilizer industry.

The products obtained by the electrical process have a great advantage over those made by present methods—they are chemically pure. All processes of refining are eliminated, with their attendant losses and expense, and the pure product is obtained at a minimum cost.

According to Prof. Chandler's figures, a kilowatt year costing \$20 will produce a ton of commercial nitric acid, having a market value of more than \$80. The other items of expense, such as labor, administration, interest and depreciation, altogether, it is claimed, will not exceed \$15, thus making a great number of commercial products at great profit from the viewless air we breathe.

A MINING ENGINEER who has made a big mistake somehow, sometime, somewhere, and who has cost some company a big lot of money, is not always a man to shun in selecting competent mine management. It simply means that someone else has paid for his experience and it is not always likely that he will repeat the extensive and expensive mistake. True he may make mistakes; so may any worker, for the man who never made a mistake never made anything else, but his liability to make even slight mistakes would greatly tend to be minimized by his costly experience.

MINING AND SCIENTIFIC PRESS.

ESTABLISHED 1860.

Published Every Saturday at 330 Market St., San Francisco, Cal.
TELEPHONE, DAVIS 771.

ANNUAL SUBSCRIPTION:

United States, Mexico and Canada.....\$3 00
All Other Countries in the Postal Union..... 5 00

Entered at the San Francisco Postoffice as second-class mail matter.

Chicago Office (Telephone, Harrison 73).....737 Monadnock Block.
Denver Office (Telephone, Olive 733).....606 Mack Block.

J. F. HALLORAN.....Publisher.

San Francisco, August 23, 1902.

TABLE OF CONTENTS.

ILLUSTRATIONS.—Arc Dynamo Used to Operate the Nitrifier; Nitrifying Chamber, Showing Loose Ends of the Inductances, Cooling Tower at Right, 98. Turquoise Mines in Arizona; The Chaleha, N. M., Turquoise Mine; New Mexico Turquoise Prospectors, 102. Gasoline Engine Exhaust Pipe; The Edwards Air Pump, 103. Mining and Metallurgical Patents, 105.

EDITORIAL.—Made From Air; Mistakes of Mining Engineers, 98. International Mining Congress; Mining Employment Bureau; The Object of Oil; Bonding of Mine Property; Reclaiming Arid Land; Platinum in Wyoming, 99.

MINING SUMMARY.—105-107-108-109-110.

LATEST MARKET REPORTS.—15.

MISCELLANEOUS.—Concentrates, 100. How to Identify Precious Stones; Cornish Pumps, 101. Turquoise Mining in Arizona and New Mexico, 102. Gasoline Engine Exhaust Pipe; Platinum; The Edwards Air Pump, 103. Electric Power in Quartz Mining; Pumping Station of the Butte Water Co.; Work on the C. P. R. Cut-off; Record Made by Schooner John Smeaton, 104. Mining and Metallurgical Patents; Mustard Gold; Blast Furnace Gas Engines, 105. Personal: Commercial Paragraphs; New Patents; Notices of Recent Patents; Obituary; Catalogues Received, 110.

International Mining Congress.

The first "International Gold Convention" met in Denver, Colo., July 7, 1897. Nearly 800 delegates, representing the United States, British Columbia, Mexico and Venezuela, were present. The Governor of Colorado was chosen temporary chairman. In the course of his address he said:

Gold is the only deity before which universal man has ever bowed. Religion has never reared an altar that has not been shaken by the shock of heresy. Political wisdom has never devised a code or constitution that did not invite revolt. No moral system has ever won general approval. Only behind the banner of gold does there trail the hungry, enthusiastic, untrained hosts of the human race. It matters not what land hore them, what faith guides them, what altar hears their prayers, what color God tinted their skins; every heart pulsates with the same love of gold—no chasm of creed or race that will not be bridged by lives and swords in its pursuit. This convention represents States that produce one-fourth of the gold of the world, and can, with encouragement of capital, double that production.

The convention committee recommended that "all discussions be confined to mines, mining and kindred subjects." Resolutions were adopted asking that cyanide of potassium be placed on the free list, and that Congress create a department of mines and mining, the head of which should be a member of the President's cabinet. A committee was appointed to revise United States mining laws and report its results to the next meeting of the convention, which changed its name to "Mining Congress," and decided to meet next in Salt Lake City, Utah.

The second annual session convened in Salt Lake City, July 6, 1898. There were 230 delegates present. Two reports were presented from the committee on proposed revision of federal mining laws. Both reports were virtually rejected. Congress was unanimously memorialized as to the necessity for a national department of mines and mining. Several technical papers were read and the Congress adjourned to next meet in Milwaukee, Wis.

September 7, 1899, was the date set for the Milwaukee meeting, but none was held. At that city, however, June 19-23, 1900, was held the third session of the Congress, which was not rated as a success, the attendance being meager, little interest being elicited, Western mining men being too busy to go a thousand miles to hear essays read by ladies and others.

The fourth annual convention began at Boise, Idaho, July 20, 1901. There was a fair attendance and the same general suggestions and recommendations made at the former meetings of the Congress were repeated and reaffirmed.

The next session of the Congress's deliberations will be at Butte, Mont., beginning September 1, 1902, and gives some promise of being run on lines that will

give metal miners of the West encouragement to take active interest.

This paper has cordially commended the aim and intent of the Congress, and would be pleased in the public interest to note continuous, active zeal in its annual gatherings.

Anything of the kind, whether it be a mining organization or other association, will have life commensurate with its usefulness; when it ceases to be any good it dies. A convention largely left to its own devices is not always capable of the highest possibilities of good at its command. The fact of its makeup makes it unavoidably unwieldy, and hence it can probably best accomplish what it sets out to do by working through suitably selected committees. The record of proceedings of the meetings can not fairly be taken as a measure of their work. It is really what the committees do that make up the real work. The annual meetings should be largely for the purpose of discussing questions of actual commercial interest to mining men, listening to the reports of the committees and instructing such committees as may be appointed for the ensuing year. The work of the Congress shouldn't stop when the chairman perfunctorily puts the "move we adjourn." It should go right on through the committees, and be really a continuous performance.

There are a great many things happening right along in the mining world. In these things the Mining Congress could have prominent and beneficial share. It should leave out sentiment and flummery and be strictly business. Rightly run, it can be of great aid to general mining interests. It can add the weight of its influence to the great effort for uniform national mining legislation, to the ever-growing demand for a cabinet department of mines and mining; it can make sound recommendations as to the commercial aspect of mining affairs the good sense of which will commend itself to miners everywhere; it can influence public opinion to a certain extent, but can do better work by one center shot than by firing a thousand arrows into the air.

The business of mining and anything in mining that it is business to consider comes under its legitimate notice.

And, on the other hand, it is to be remembered that the standard of criticism by which it is to be judged should be a kindly one. It is the creature of the miners themselves; they can vivify or kill it, and its ability for good, or even its excuse for existence, is in direct proportion to the moral or material aid extended to it by the men whom it represents.

Mining Employment Bureau.

At various times suggestion is made regarding economy in mining operations, more or less practical. One of those suggestions is the basis of a scheme now started in Germany. Its title and scope do not agree with the heading of this article, but that is really what it amounts to.

At intervals organizations with various titles have been started in this country, designed ostensibly to be of public benefit, but destined to dissolution because of inherent tendency to subordinate the scheme to private interests.

With what appears to be commendable intent has been organized at Frankfurt, Germany, an association calling itself the Central Mining Institute, which claims to be independent, founded on public requirements, and in touch with actual technical and economic mining and scientific conditions. It is composed of bankers, promoters, merchants "and others," doing business in different German cities, and announces that as an organization it will not engage directly or indirectly in mining or other industrial enterprises, and any of its members who propose doing anything of that kind must first get permission from the management. The organization proclaims its ability and intent to assist investors, furnish reliable and unbiased advice and in general to put the whole business of mine investment upon a high scientific and economical plane. The institute will make no charge less than 50 marks, and, whatever its profits, will never declare a dividend to exceed 5% annually on the capital stock.

Among other things it offers to do are:

Recommendation of experts; negotiating the engagement of experts; giving instructions to experts; undertaking mining operations for the investigation

of deposits; prospecting, boring, opening up of old workings, and exploration of work; advice in matters relating to claims and concessions; execution of geographical, geological and mining surveys; preparation and equipment of expeditions abroad for the investigation of larger objects; practical tests in connection with concentration and metallurgical treatment; assisting investors with a view to an experimental working of mines; a sketch of or opinions on the working schedules of mines; technical and economic advice concerning the working of mines; supervision of the work of mines; determination and tests of ores and minerals; assays and chemical analysis of such samples; information relating to claims and concessions; information concerning mining law and mining administration, general mining conditions in the most important countries and districts, methods of working, labor conditions and other economic, social and legal questions in connection with mining; information relative to the geographical position, geological and climatic conditions; addressing inquiries to institutions and experts concerning metallurgical treatment and results, communicating to clients and information received.

In special cases, the Central Mining Institute also undertakes:

The preliminary examination of proposed enterprises, based on expert reports, estimate of costs, maps, plans, etc., with a view to determining whether the institute shall advise:

(a) Whether or not the proposition should be entertained. (b) Whether a more detailed expert report should be made. (c) Whether the data submitted are sufficient warrant for a favorable consideration of the proposition.

Criticisms or reports and data submitted by experts; to make local investigations and render expert opinions.

This is an extensive program. It may be that many American miners reading it may say or think: "This is the thing we long have sought, and mourned because we found it not." The plan is ideal, almost Utopian. That it deserves commendation goes without saying. If such a mining employment bureau can live and prosper it will be of direct benefit and encouragement to miners anywhere, and its success should be chronicled with delight.

THE object of oil is to diminish friction by interposing a thin film between the sliding surfaces. To insure perfect lubrication the surfaces must be kept coated at all times and under all pressures and velocities. In steam engines there is a sliding and a rotating friction, and it is doubtful if any one kind of oil is perfectly suited to both. Oil has no tendency to improve the character of a bearing, its function being simply to keep the bearings apart and prevent friction and heating.

In the bonding of mine property it is difficult to preserve proper proportion between the bond and hondee. The general tendency is to make the time for which the bond is given shorter than heretofore, as mine owners object more and more to tying up their properties with men who may not do anything with it except make a commission on a sale, though a working bond with forfeiture clause would usually obviate that difficulty. Much depends on the mine and more on the bond, but as a rule six months should be long enough.

F. H. NEWELL, chief of hydrography of the United States Geological Survey, is traversing the west half of America in furtherance of the work that has been under his direction since 1890—reclaiming the vast tracts of arid land. It is a tremendous work, one that has been at last undertaken in a practical way by the general government, and a matter that is of direct interest to mining men. "The tree is the mother of the fountain." The conservation of water is becoming more and more a pressing necessity, and in the work which is well represented by Mr. Newell and his associates lies a large measure of the country's welfare and progress.

On page 103 appears a statement, apparently official, regarding the alleged discovery of platinum in Wyoming. At the time of the announced discovery two samples of the ore in question were sent to this office and examined, with no corroboration of the assertion. It is believed that the U. S. G. S. statement in the article on page 103 is a mistake. This week is received an account in detail of the finding of platinum in place at Burnt Basin, B. C., which appears more authentic than the statement from Wyoming was. Similar statements are often made, but so far with no foundation in fact. The finding of platinum in place would be an event of great metallurgical importance.

Concentrates.

AN injector requires steam for its successful operation; hot water will not answer the purpose.

HEATING by direct radiation means that the radiators are located directly in the rooms to be heated.

THE Kennedy, Amador county, Cal., is probably the deepest purely gold mine in the country—2600 feet.

IN "a carload of miners' candles" there would be or could be 500 boxes, 240 each, and 160 boxes, 120 each—139,200 candles.

A ROUND tank 15 feet in diameter, 20 feet high, would hold 26,440 gallons. Counting 25 cubic feet to the ton, it would hold 141.4 tons ore.

APERTURES in the form of a circle are the most effective for the discharge of water, because for the same area there is less frictional surface.

THE only electrolytic nickel and copper refinery in operation in America at the present time is the Canadian Copper Co.'s plant near Cleveland, O.

SOME geologists hold that the gold of the Rand, South Africa, has a marine placer origin, and is neither the result of impregnation nor precipitation.

IT is not at all unusual for duplex sinking pumps submerged over 100 feet when furnished with steam to start up, clear themselves and pump the shaft out.

AN aperture 12 inches high, 12½ inches wide, in a 1½-inch plank, head 6 inches above top of opening, will discharge 200 miner's inches, each equal to 1.4994 cubic foot water per minute.

IN any capacity around a mine everybody has not only to look out for himself, but for all others. Ordinarily one has only to take care of himself, but in or around a mine he must care for others, too.

WIRELESS TELEGRAPHY is considered a commercial success. Besides transmission of news, pictures have been sent by this means, and shore operators can light or extinguish incandescent electric lamps at will.

THE resistance of friction in the flow of water through pipes increases as the distance is greater. In wooden pipes the friction is 1.75 times greater than in metallic pipes. Doubling the diameter of a pipe increases the capacity four times.

THE tensile strength of a rivet is usually much greater than its shearing strength, but this is counterbalanced by the fact that when two boiler plates are riveted together, the friction which must be overcome before they can be torn apart is very great.

THE "non-accessible stock" advertised in the Eastern paper is probably meant for "non-assessable" stock, though in the case brought to "Concentrates" notice there is little choice, except that in any event the buyer should be allowed "access" to the stock.

IT is a good plan to let the engine exhaust into the heating system, but it is not necessary or advisable to have the inner surface of the pipes coated with the dregs of cylinder oil. It is well to put a separator in the exhaust pipe and locate it near the engine.

ACCORDING to a decision recently made by Binger Hermann, Commissioner of the General Land Office at Washington, before a claimant can secure a patent to a desert land entry he must be the owner of a permanent water right and have conveyed the water to the land in permanent ditches.

THERE are several good manufactured coverings for steam pipes. If impossible to get any of them in the isolated spot from which the inquiry comes sawdust mortar might be used. A 6-inch pipe can be boxed in a wooden box of 10 inches diameter filled with sawdust mortar—one barrel of lime to five of sawdust.

ORDINARILY the term ore dressing may be considered as separating different minerals in such a way as to place each distinct product in proper shape for market. Concentration is quite different, being the rejection of the maximum possible quantity of waste material that the ore thus enriched may more readily pay transportation and treatment charges.

A MINER'S INCH of water, legal measure, in the State of California (Civil Code, Sec. 1415), is that quantity of water which will flow through an opening of 1 square inch in the bottom or side of a vessel, under pressure of 4 inches above the opening. One miner's inch will discharge in twenty-four hours 2,260 6 cubic feet, or 16,756 gallons. This amount of water would fill a cube of 13 feet 1½ inches in diameter and would weigh 70½ tons.

OUTSIDE of California quicksilver is produced in marketable quantities in Oregon, British Columbia and Texas. In Brewster county, Texas, two companies are producing, the 1901 output being about 3000 flasks. The Texas cinnabar is of the crystalline variety; native quicksilver is also found in limestone there. A technical description of the Terlingua, Texas, quicksilver deposits, written for this paper by a member of the U. S. Geological Survey, appeared in a recent issue.

"A FOOT OF WATER" is the amount flowing through an opening a foot square under 4 inches pressure, or 1 cubic foot per second flowing through an opening of 50 square inches. Where 750 feet of water is carried in a ditch the water will move 12 feet per second on the grade stated in the query, which would wash out the ditch in little time. Water moving next the bed of a ditch at the rate of ½ mile per hour will move fine sand, will

move gravel when so flowing at the rate of ¾ mile per hour; gravel, 1 inch diameter, 1½ mile per hour; soft rock 3½ miles per hour.

ONE GALLON of fresh water weighs 8½ pounds. One cubic foot of water contains 7 4805 gallons and weighs 62.37907 pounds. For convenience of computation, a cubic foot of water contains 7½ gallons and its weight is taken at 1000 ounces, or 62½ pounds avoirdupois. Two hundred and forty gallons of water weigh one ton of 2000 pounds and measures 32 cubic feet. The water (240 gallons weighing one ton) would fill a cube measuring 3 feet 2 inches for each of its three dimensions.

MANIFESTLY the immediate cause of the glacial period in the Sierra Nevada mountains was heavy precipitation combined with sufficient cold to cause the water to fall as snow. The general cause was cosmic and elevation was secondary. With the present precipitation at Summit, Truckee and other California points a slight average decrease of temperature would cause a revival and advance of Sierra Nevada glaciers. There have been two ice periods in the Sierras, and in the eons of future time a third is among geological possibilities.

THE following is a formula for water-proofing blue prints: Immerse in melted paraffine until saturated a number of pieces of an absorbent cloth. When these are withdrawn and cooled they are ready for use at any time. To apply to a blue print, spread one of the saturated cloths on a smooth surface, place the dry print on it with a second waxed cloth on top, and iron with a moderately hot flat iron. The paper immediately absorbs paraffine until saturated, and becomes translucent and highly water-proof. The lines of the print are intensified by the process, and there is no shrinking or distortion.

THE U. S. Circuit Court of Appeals, 79 Federal Reporter, page 277, decided in the case of Republican M. Co. vs. Tyler M. Co., that when a lode enters an end line of a regularly located mining claim, and runs its course, lengthwise, nearly parallel with the side lines of the claim for the greater part of the length of the claim, the owners of the claim are not deprived of their extralateral rights because the lode crosses a side line before reaching the other end line, but such rights will extend from the end at which the lode enters to the point at which it crosses the side line, whether a new end line is regarded as being drawn at that point or not.

TO PREVENT explosions from low water, boilers should always be provided in the highest part of their crown-sheet with a hollow brass plug having the cavity filled with tin, which melts at a temperature of 442° F. If the water falls below this point, the tin becomes overheated and melts, thus allowing a jet of steam to escape as a warning of the approaching danger. All boilers should have a pump attached for filling them when the injector is out of order or is being repaired, and the water should be hot, like that from a feed water heater. When two or more boilers are connected with the main steam pipe, due allowance should be made for contraction and expansion, so that the lateral connection may not be injured.

IN speaking of the capacity of a certain compressed air plant as being equivalent to forty drills, this power is true of the machinery only at sea level. The altitude of Rossland, B. C., being 3410 feet above sea level, means the pressure of the atmosphere is not equivalent to a column of mercury 30 inches in height, but to one of something less than 27 inches, hence the mechanical power of the engine has first to overcome this greater tenuity of the air before it can begin to compress the atmosphere to a greater density, so as to develop power at the drills employed. The size of the drills also makes a difference. The power of a compressor at sea level and calculated to work steels 2½ inches in diameter, which can be expressed at forty drills, would in Rossland, at a higher level, with a larger drill, be better expressed by a 22% reduction.

IT has always been difficult to determine the actual amount of moisture which is contained in steam; some light is thrown on the subject by the use of superheated steam. For instance, at a working pressure of 125 pounds 1% moisture would represent about 20° of superheat. Under the best conditions of properly proportioned steam pipes, and well covered, there is a loss of ½° to ¾° F. of superheat per foot of steam pipe. It would not be out of reason to assume that with ordinary large and indifferently covered steam pipe the loss would reach 1° F. for every foot of pipe; consequently a pipe 100 feet long might lose 100° of superheat, corresponding to 5% of moisture in the steam, provided the steam was dry on leaving the boiler. Even assuming ¾° loss per foot, we should have a condensation of 2½% in a steam pipe of this length.

THE extraction of antimony is difficult, owing to its volatility and affinity for oxygen. The process consists in heating the crude ore covered with charcoal on the bed of a furnace, when the sulphide of antimony fuses, leaving unmelted the earthy impurities; the liquid is drawn off into iron molds, where it solidifies and is reduced to coarse powder, placed on the bed of a reverberatory furnace and heated with access of air, for the oxygen contained therein, when the sulphur passes away as gaseous sulphurous acid, leaving behind the antimony teroxide. The roasted mass is then mixed with one-sixth of its weight of powdered charcoal, the whole moistened with a solution of carbonate of soda and raised to bright redness in crucibles, when the metal antimony trickles to the bottom, the impurities left above in the spent flux or scoria, the crocus of antimony.

A CUBIC FOOT of solid quartz weighs 166½ pounds avoirdupois; its specific gravity (with water as the unit, viz., 1.000) is 2.660; that is, quartz is 2½ times as heavy as water; the weight of water is about 37½% that of solid quartz. Twelve cubic feet of solid quartz in place will weigh one ton of 2000 pounds avoirdupois; but a quartz vein contains 12%, more or less, waste, and on that account 13 to 14 cubic feet of vein quartz will constitute a ton. A fair average, allowing for waste, in a running vein should be 13½ cubic feet to the ton of 2000 pounds. On this basis a cubic foot would weigh 148.15 pounds. A cube of this ordinary quartz, 2 feet 4½ inches dimensions, would contain 13½ cubic feet and weigh one ton of 2000 pounds. A cube of the same dimensions filled with water would weigh only 843½ pounds, showing that the weight of water is about 42% of the weight of ordinary quartz weighing 13½ cubic feet to the ton.

REGARDING the advantage of obtaining metal from a sulphate as against a chloride solution, those in charge of large electrolytic refining works have not been prevailed upon to adopt the chloride solution method, instead of the method in present use. The chloride method is old, has been tried under a variety of conditions and with modifications, but has not yet attained commercially practical prominence. Electro-metallurgists are aware that the speed of reaction is too slow, and the apparatus and process too complicated for ordinary practical purposes. In a few cases it may be desirable to utilize the evolved chlorine, and the chloride method may then be found suitable, but it is deemed inadvisable at present for large refiners to go to the expense of erecting a costly plant for liquefying chlorine gas or making bleaching powder when it is considered that the returns would be reduced to an unprofitably low figure as soon as such methods were generally adopted and the market flooded with chlorine obtained in that way.

THERE are two methods in general use for testing boilers, known as the hydraulic and the hammer tests. The former is made by filling the boiler with water, and then by using a force pump the pressure is raised to 50% more than it is intended to carry the steam. Thus a boiler which should carry 100 pounds steam pressure must stand a 150-pound hydraulic test, and this percentage increase in hydrostatic pressure is commonly adopted by boiler inspectors. The steam gauge should be used to determine the actual pressure, and this should be of standard make and known to be correct. Without such knowledge the test is useless and may result in injury to the boiler through excessive pressure. The hydraulic test even under the best method of application is liable to strain the boiler so much that when it is heated again the expansion may produce a leak. In the hammer test, all accessible parts of the boiler are tapped with a light hammer, including the shell, crown-sheet, front and back connections, tubes and braces. The sound produced shows to the practiced ear the condition of the boiler.

SPECIFIC HEAT means the quantity of heat necessary to raise the temperature of a body a given amount, compared to the quantity required to raise the temperature of the same weight of water a like amount. For instance, the specific heat of cast iron is .1298; this means that it will require but .1298%, or, practically, one-eighth as much heat to raise the temperature of one pound of cast iron 1° as would be required to raise the temperature of one pound of pure water 1°, the latter quantity being accepted as the standard. Suppose the temperature of one pound of water is raised 100°. This same amount of heat, if put into a pound of cast iron, will raise the temperature more than 100°, because it only requires about one-eighth as much heat to raise the temperature a given amount. To find out just how much the temperature of the cast iron will be raised, one may multiply the quantity required by the water by eight, or divide it by the specific heat of cast iron. The 100° increase in the temperature of the pound of water will be equivalent to an increase of 100 ÷ .1298 = 770.4° in the temperature of the pound of cast iron.

COMMON solder contains equal weights of lead and tin; fine solder contains two parts of tin and one of lead; coarse solder two parts of lead and one of tin. In solder the proportions of metal can be judged from the appearance of the alloy. When it contains a little more than one-third of its weight of tin, its surface, on cooling, exhibits circular spots due to a partial separation of the metals, but these disappear when the alloy contains two-thirds of its weight of tin. These alloys melt at a much lower temperature than either of their constituent metals. Common solder melts at about 240° C., and fine solder at 180° C., while the melting point of tin is 232° C., and that of lead 327° C. Soldering is not entirely a mechanical adhesion, depending, partly, on the formation of an alloy between the solder and the surface of the metal to be soldered. This makes it absolutely necessary that the surfaces to be united by the intervention of solder shall be perfectly bright and free from oxide. Several substances are employed to insure this at the moment of applying the solder; one of the commonest is muriatic (hydrochloric) acid, "killed" with zinc; that is, in which a lump of zinc has been dissolved to form a chloride of zinc which melts over the surface of the work, dissolving any oxide and protecting the metal from the oxidizing action of the air. Sal-ammoniac, or sal-ammoniac and chloride of zinc, are sometimes used. Resin in powder is often sprinkled over the metal to be soldered, when the heat melts it and forms a varnish to protect the metal's surface from the oxygen of the air.

How to Identify Precious Stones.

In last week's issue appeared a report from Nelson Creek, Plumas county, Cal., that what were believed to be diamonds had been discovered there.

Diamonds have been discovered at various points in California, notably near Placerville, El Dorado county, and Cherokee, Butte county. The formation at the latest report scene of diamond discovery is not considered extremely favorable to diamond formation. A few remarks on how to identify precious stones in general may be timely:

Difficulty is frequently experienced by prospectors and others, who have not had opportunities of handling precious stones in the rough, to distinguish them one from another and discriminate between gems of great value and others which are comparatively worthless. It is a mistake to place any reliance whatever upon color as a test of a precious stone, as there is no property natural to gems which is so fickle and unreliable as that of color. For instance, if a stone be red, it is not of necessity a ruby, nor a white stone a diamond; and are there not yellow sapphires, green diamonds and blue spinels? Of course, the connoisseur and expert in gems values and appreciates the slightest variation of tone and depth of coloring in jewels which may increase or decrease their value upon the market. In the diagnosis of precious stones it is advisable to apply as many different tests as possible to each specimen, and to be guided by the result of them all, as it often happens that one is apt to be misled by the application of a single test.

Most of the precious stones (opal and turquoise are the exceptions) are crystals of rare minerals occurring in nature in more or less familiar geometric crystalline forms, such as cubes, octahedra, rhombic dodecahedra, hexagonal pyramids, scalenohedra, prisms, etc., which are classified by mineralogists into six systems, the study of which comprises the science of crystallography. Although a knowledge of crystallography, or the natural forms in which crystals occur, is of value in successful discrimination of rough precious stones, it is not a subject which can be easily mastered, or brought into practical use without considerable application and study. The reason for this is that, with the exception of diamonds and a few other gems, crystallizing in the "Cubic System," precious stones are seldom found to exhibit more than a trace of their characteristic crystalline formation, which fact is due to accidents at some remote period of their existence, rough usage while immersed in rivers and torrents, etc.

The natural properties of gems, which are most easily and most universally used as tests, are those of "hardness" and "specific gravity." By the hardness of a gem is meant the degree which it possesses of resisting abrasion. Many of the hardest minerals can be easily broken, fractured or chipped, though they can not be scratched; thus, a very hard stone may be a very brittle one. Diamonds, emeralds and zircons, for instance, have often been injured by a blow or a fall. There is a scale of hardness, consisting of twelve minerals, which forms a recognized standard to which specimens under examination may be compared, as follows: Diamond, 10; sapphire, 9; topaz, 8; quartz, 7; feldspar, 6; apatite, 5; fluor spar, 4; calcite, 3; rock salt, 2; talc, 1. Fragments of these minerals, suitably mounted in little handles, are applied in succession to the gem to be examined, so as to attempt to scratch it. When the gem neither scratches nor is scratched by any member of the scale, the two stones may be considered of the same hardness. When it scratches the softer and is scratched by the harder of the two test stones, some idea of its position between them may be obtained by drawing all three specimens, with slight pressure, across the surface of a fine, clean, hard file, and noticing the different degrees of resistance to abrasion and the sound produced. This operation requires to be done with a delicacy of touch made perfect by practice alone. The following list of a few of the gems and their degrees of hardness will serve to show their relative position: Diamond, 10; sapphire, 9; ruby, 8.8; chrysoberyl, 8.5; zircon, 7.8; emerald, 7.8; green garnet, 6. It is an interesting fact, although of no importance in distinguishing precious stones, that slight variations in hardness exist between individual specimens of the same kind of gem brought from different parts of the world, and often, too, even between those obtained from various mines in the same locality. Thus, the toughest diamonds come from Australia, while Indian and Brazilian stones are harder than those from the Cape.

To obtain the "specific gravity" of a stone is to ascertain its weight compared with the weight of an equal bulk of distilled water (generally taken at 60° F. or 15.6° C.). There are several methods of applying this test. The one in general use consists of a delicate balance, by which means a stone may be first weighed in air and then in water; thus the weight of the bulk of water displaced may be ascertained. If, for instance, a sapphire weighing 4 grains in air weighs only 3 grains in water, it has evidently displaced 1 grain of water, becoming lighter by that amount—so that the number 4 represents the specific

gravity of sapphire, showing, as it does, the number of times that the weight of any bulk of that stone contains the weight of an equal bulk of water. Another method of performing this test is by measuring or weighing, directly or by difference, the water which the gem displaces when immersed in water in a small vessel of known capacity; but this method does not admit of great exactness. By far the simplest means, however, of obtaining the specific gravity has been introduced lately. Liquids of different degrees of density are used, in which the gems either float or sink according to their relative weight. A solution of mercuric iodide in potassium iodide ("Sonstadt's solution") is a liquid of great service, which should be made up to solutions of several different densities, viz.: Solution A = 3.17; solution B = 2.9; solution C = 2.67; solution D = 2.63. This fluid has, however, the disadvantage of being very poisonous and corrosive. Another suitable liquid is methylene iodide, which is easily diluted by the addition of benzine—each drop of benzine making the liquid less dense. Nothing can be easier or more satisfactory than this method; however minute the stone may be, it can be identified by its density in a few moments. Suppose it be doubtful whether a certain gem is an aquamarine or a chrysoberyl; all that is necessary is to place it in a tube of methylene iodide, together with a small fragment known to be aquamarine, to serve as an index. If it be a chrysoberyl, which has a specific gravity of 3.6, it will immediately sink; if it be an aquamarine, which has a specific gravity of 2.7, it will float, in which latter case, if the liquid be diluted and stirred until the index fragment is exactly suspended, the doubtful gem also will neither float nor sink, but will remain poised beside it. The delicacy and simplicity of this method is great; the only reason why it has not been more generally adopted is that a great number of gem stones are heavier than methylene iodide. But this objection is now removed. There is a colorless solid compound which melts at a temperature far below that of boiling water to a clear liquid five times as dense as water, and, therefore, sufficiently dense to float any known precious stone. This compound is a double nitrate of silver and thallium, and possesses the remarkable property of mixing in any desired proportion with warm water, so that by dilution the specific gravity may be easily reduced. The fused mass may be reduced in density by adding water drop by drop, so as to suspend in succession jargon, carbuncle, sapphire, ruby, chrysoberyl and spinel.

The optical properties of precious stones form valuable means of identifying them, especially when cut and polished; and there are several different kinds of scientific instruments of a more or less practical character which can be applied in this connection. The method of measuring the extent to which a ray of light is refracted in passing through a gem may be measured by the goniometer, an instrument found in every physical laboratory. In order to avoid the necessity of cutting the stone into a prism, it is advisable—after finding two of the facets, which form a convenient angle—to paint over the remainder of the stone. The ray of light may then be traced through the two open facets, and in this way can be measured not only the refraction, but the double refraction of the stone. For this purpose, also, the little instrument known as the reflectometer is simple, but only useful to examine gems of low refractive power, such as topaz and less brilliant gems. The dichroscope is an instrument which enables one to tell at a glance whether a gem be doubly refractive or not, thereby deciding at once if the specimen belongs to the cubic system of crystallography or not. This is of value in distinguishing rubies and sapphires from other somewhat similar stones which might be mistaken for them, and is in general use among gem merchants. It is not commonly known that many transparent minerals, when viewed through a spectroscope, cause characteristic black bands to appear across the spectrum. Two of these minerals happen to be the gem stones jargon and almadine garnet, sometimes called carbuncle. When a stone, say, one set in a ring, is looked at in this way and gives the characteristic spectrum of zircon, it is at once known to be jargon, without any further trouble. A crystal of tourmaline, while being warmed, becomes electrified, one end becoming charged with positive and the other end with negative electricity. Advantage has been taken of this fact to make a test for tourmaline. If a mixture of powdered red lead and sulphur be blown or shaken through a sieve, the particles become electrified by mutual friction, and if it then be dusted upon a crystal of tourmaline which is being warmed, the positively electrified end of the crystal attracts the negatively electrified yellow sulphur, and the other end attracts the positively electrified red lead—thus one end of the crystal becomes red and the other yellow. Now every crystal of tourmaline behaves in this way, and no other gem stone, so that this is a practical test as well as a pretty experiment. If a drop of water be placed by means of a needle on the stone to be tested, which has previously been thoroughly cleaned, the drop will spread out on an imitation, while it retains its drop shape on a true diamond. A strip of aluminum may be passed over a diamond, from which all grease has been removed, without it acquiring even a trace of it. On imitations, however, the metal will give off some of its color. A sure test, however, is hydrofluoric acid,

which, applied to the true diamond, will not affect it, but will eat into and frost an imitation.

A knowledge of precious stones, however, is not a subject which can be acquired in half an hour, but necessitates a good deal of close application and constant practice.

Cornish Pumps.

The largest Cornish pumping plant is the Chapin pump of the Chapin M. Co., Iron Mountain, Mich., designed to pump 3000 gallons per minute from a depth of 1500 feet. The engine is of the vertical type and compound, and stands 54 feet from the floor. The high pressure cylinder is 50 inches and low pressure cylinder 100 inches in diameter, stroke 10 feet. The flywheel is 40 feet diameter and weighs 164 tons. The total weight of the engine, exclusive of pump and shaft works, is 600 tons.

The pump end is attached directly to the beam end which overhangs the shaft. The pumps are of single-acting Cornish type, plungers 28 inches in diameter, 10-foot stroke; number of strokes, from four to ten; pumps are arranged in series, each set with a lift of about 200 feet. The plant was designed and built by the E. P. Allis Co. of Milwaukee, Wis.

There is a large Cornish pumping engine at the Ontario mine, at Park City, Utah.

As the various shafts and levels have been extended the amount of water to be handled steadily increased. Up to the time that the drainage tunnel was constructed from No. 3 shaft, at the 600-foot level, all the water—about 4500 gallons per minute—was pumped and discharged through a short tunnel about 500 feet from the surface. The first drainage tunnel from No. 3 shaft carried off all the water of the mine as low as the 600-foot level.

Below this level, however, all the water had to be pumped, and it was decided to erect a large Cornish pump. The pump, which was installed at the mouth of shaft No. 3, was from the design of W. R. Eckhart of San Francisco.

The two large cylinders are nearly vertical, being at the same height and inclined toward each other at the top. The high pressure cylinder is 38½ inches in diameter; low pressure, 70 inches; stroke of each, 10 feet. The cylinders are both steam-jacketed, and have cut-off valves, though the steam is usually controlled by the throttle valve. The piston rods are connected by the opposite ends of a walking beam, or "hob," the connecting rod to the crank which turns the flywheel is attached to a pin at the top of the hob. This connecting rod is 28 feet long; the arms are 14 feet 6 inches. The flywheel is 30 feet in diameter and weighs fifty tons, its shaft being 22 inches at the flywheel, 16 inches at the outboard and 20 inches at the crank rod journal. The engine's speed is five to seven revolutions per minute; it works with a steam pressure of 100 pounds. The engine uses a jet condenser. The connecting rod to the pump rod is attached to the hob at the same end as the connecting rod of the high pressure cylinder, but lower down, the distance from center of pins being 4 feet 2 inches, with 14-inch diameter journals, the journals for pins for the engine connections being 10½ inches in diameter. The total weight of the hob is seventy-five tons. The foundations of the engine are 54 feet below the surface, the cut stone necessary being carried up. Over 7000 tons of quarried work were required in the foundations. The pump shaft is 7x9 feet, with enlargements at pump and hob stations, and is heavily timbered. The pumps are located at the 1000-foot and 800 foot levels, water being pumped up to the 600-foot level. The pump rod is made of 16-inch square pine, in 60 to 80-foot lengths, the joints being made by four straps of iron 1x12 inches by 30 feet, thus giving a lap of 15 feet. The two pump columns are 18 inches in diameter and are riveted wrought iron. At the 300-foot, 500-foot and 700-foot levels are placed balance hobs connected with the pump rod, the design being to give the engine the same amount of work on the up and down strokes. These balance hobs each have counterweights of twenty-nine tons. The two pumps at the 1000-foot level have 20-inch plungers, with 10-foot stroke. The sump is 45 feet deep, but is nearly always full, the suction never exceeding 10 feet. Between 300 and 350 gallons are pumped at each stroke, the water discharging from the lower pumps into a tank located upon the 800-foot level, where two pumps similar to those at the bottom are put in. The capacity is about 2500 gallons per minute. The engine and pumps cost at the factory \$110,000; the total cost, including foundations, erection, buildings, pump, shaft equipment, etc., was about \$250,000. Besides the Cornish pump, there are four steam pumps underground to relieve it in emergencies, and to act as auxiliaries during the largest flows of water. There is one each at the 1000-foot and 800-foot levels of shaft No. 3. There are two additional columns of 15 inches diameter each in the pump shaft for these pumps. Steam is supplied to the pumps in No. 3 shaft by a 6-inch pipe, jacketed with 1½ inch of asbestos, and about 1000 feet long in all. Coal is hauled from the mines at Coalville, 22 miles distant, and costs \$4 to \$4.50 delivered at the mines.

Turquoise Mining in Arizona and New Mexico.

Turquoise is found in California, Nevada, New Mexico and Arizona. In New Mexico are the most extensive developments of turquoise on the American continent. The Mexican name for this stone is chalcitl. The mines of New Mexico were operated long prior to the Spanish conquest. Near Cerrillos, south-

greatly. In the vicinity of Santa Fe the matrix is usually a white trachyte stone filled with bright crystals of pyrites, which upon decomposition from exposure turns a rusty brown. In some cases the matrix is red sandstone. In the Burro mountains the formation is rose quartz, slender needles of which penetrate the turquoise deposit, spoiling it for gem purposes. In the Hachitas the matrix is a red granite. It is difficult to account for these vagaries in formation, existing in the case of no other mineral known to science. The turquoise solution in the form

quoise rock shows up in paying quantities. Then drifting begins, the rock is blasted and then broken into portable shape by sledge hammers, then put into a bucket and hoisted to the surface by windlass, then

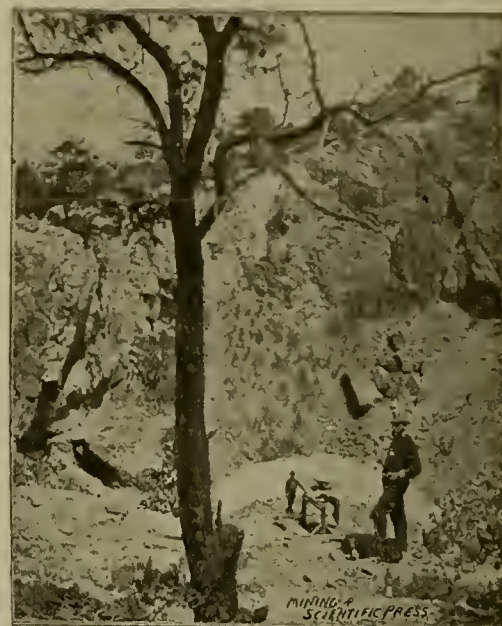


Turquoise Mines in Arizona: "Turquoise Mountains," 2½ Miles South of Mineral Park. The mountain has shafts sunk in a number of places by ancient miners "in the Stone Age." Stone hammers and prehistoric tools are scattered over the surface.

ern Santa Fe county, is a section of mountainous country over 200 acres in extent, every foot of which has been worked over in search of turquoise. The Indian method was crude, the only implement being a stone hammer. The New Mexican miner of to-day follows the lead of his Indian predecessor in these old mines, but goes about 10 feet deeper, there finding his purest gems. The Indians had a primitive method of blasting turquoise rock. Over the mass they would build a hot fire and then dash water upon it, causing the rock to crack. Then the stone hammers came into play and the ore was crushed into small pieces, then polished as beads, which were drilled, strung and worn as ornaments or charms.

Valuable turquoise deposits exist, notably in the Burro mountains near Silver City, about the Hachitas and in the Jarillas as far south as Las Cruces. Near Cerrillos most of the claims are the old filled-up

of a liquid was at some period infiltrated into the seams of the rock, where it gradually solidified. This is demonstrated by the fact that wherever the veins are wide enough the turquoise are found in uniform pebbles with a talcose surrounding. Turquoise is found in commercial quantities in Lincoln Co., Nev., and San Bernardino Co., Cal. Bulletin No. 25, compiled by Chas. G. Yale, and issued by California State



The Chaleha, N. M., Turquoise Mine.

sorted, packed into boxes and shipped to firms that have contracts with the mine owners for cutting. Most of the New Mexican turquoise goes to New York, very little being cut in the Territory. The average Mexican turquoise miner gets \$1.50 per day; Americans get \$2.50. The larger mines work only seven to ten men each, and in good rock this force could take out from \$8000 to \$10,000 daily. This was the record of one mine near Cerrillos for six months, then the pay streak petered out and there was three months of dead work. Those engaged in this industry, knowing that they have a good thing, try to create the impression that the mines are being conducted at a loss. This causes them to maintain strict secrecy in everything relating to business. They will not allow photographs to be made, or consent to allow any one to inspect the mines; neither will they give any information concerning the subject in general.



Turquoise Mines in Arizona: Some fine gems were found on the summit of this hill, 6500 feet above sea level, 1 mile east of Mineral Park, Mohave County, Arizona.



New Mexico Turquoise Prospectors.

mines of slavery days, though several have been opened on virgin ground. Great secrecy is maintained, both as to the location of mines and the method of working them. No one is allowed to inspect a turquoise mine, and employees are warned against giving any information concerning operation upon pain of immediate discharge.

The formation in which turquoise is found varies

Mineralogist L. E. Aubury on Aug. 15, 1902, states that in 1901 there were mined in San Bernardino Co., Cal., 500 pounds turquoise, worth \$20,000.

Chemically, the American turquoise has about the same properties as the Persian product, the former being composed of: Alumina, 47.75; phosphoric acid, 27.34; water, 18.18; protoxide of copper, 2.02; peroxide of iron, 1.10; peroxide of manganese, 0.50; calcium phosphate, 3.41.

The profit in turquoise mining is found in the simple and inexpensive methods of handling the ore. No costly machinery, no intricate and expensive treatment of the product of these mines are required. From surface indications a shaft is sunk, until tur-

Turquoise mining has its troubles and trials, like all other forms of mining, and the turquoise prospector is, like other prospectors, subject to imposition.

Under date of August 6, 1902, Jas. W. Haas, a veteran Arizona miner of thirty-seven years' varied experience, sends two photographs and tells of some of the inside workings of turquoise mining and prospecting, which, though not meant for publication, will be read with relish by many who have been through pretty much the same general experience. Writing from Mineral Park, Mr. Haas says:

"I sometimes see in the MINING AND SCIENTIFIC PRESS mention of the turquoise found in California

and New Mexico; but very little is now said of the turquoise in Arizona. Now I will give you a brief idea or sketch of the turquoise and mines in this section, as I am the man who worked for years to bring them into market and prominence. I have just sold to a New York company, or people, who now style themselves the Aztec Turquoise Co., and who have expended over \$30,000 in labor and improvements in less than two years. I have shipped to them in New York over \$100,000 worth of gems and stones from their mines here.

"About twenty-eight years ago, in prospecting for precious metals, I came across an old dump which had been worked by soldiers stationed at Fort Mohave—a company of the California Volunteers—about 2½ miles south from Mineral Park; on that dump and scattered over the ground were small pieces of blue and green stone, and chunks of granite with creases around the center, which we afterwards found to be stone hammers, made of granite and very hard. I took some of the blue or green stone, after pounding it up, to an assayer who was running the Mineral Park mill; he assayed it—with no returns. I sunk the shaft a little deeper—found nothing; so let it go. A short time after I learned of some one finding turquoise over that way. I went over there and, lo! in the same old shaft that was sunk by the soldiers and ancients, were men at work. They had the ground located; the men working there were from New Mexico; they worked a little while, went away and did not come back. In due course of time the ground was subject to location. I then located it and went to work. Some men would come along, and, seeing me at work on nothing, would say: 'Crazy!' I got a few pieces of the stone and sent it to Tiffany of New York. George Kuntz, his expert, declared it was all right, but would be better if it was gone down on farther. I went down a little farther, with no good results, and, having no money, I quit it, but did not abandon it. I prospected east of it on the hill and found several old shafts that were sunk by prehistoric miners; beautiful pieces of blue stone, with others, all over that section; I picked up several pounds; sent some to France, Germany, Switzerland, England and Belgium. From nearly all I got returns; they would have some fault to find—it was either too light, too dark, too green, or too something, but always with the request to 'send three or four pounds,' and they would 'pay the postage'—but I could get no one to help me develop. It lay idle for two years. I went over there again and found a notice with Sarah Althea Hill-Terry's name on it; but that poor woman never did any work on it. Before the time ran out an individual located it for a Denver, Colo., syndicate; they did about \$50 worth of work and then left it. It lay there idle, nothing done on it, for two years more. I then located it again and went to work. I sent stone to parties north, south, east and west to advertise it. No one wanted it. Finally, a man traveling on the A. & P. R. R. heard of it, came to see me. He had plenty money. (?) He took it to New York, under lease and bond, for \$10,000. I thought \$10,000 would be better to me alive than \$50,000 after I was dead. He got a rich man there interested in it, who put up \$2000 cash—\$1000 the promoter was to pay me on the lease and bond and \$1000 for his expenses going and coming from New York. The schemer came out here, gave me \$500 and kept the \$1500 and went God knows where—and he is there yet. I believe his conscience had stricken him or I never would have got a cent; but I treated him kindly, and perhaps he thought I might hurt him up; but he does not dare go back to New York. However, I did not propose that the gentleman who put up the \$2000 should be the loser. I protected his interest, even if I did not get my money. His name was in the lease and bond, of which I had a copy, and, after a dullness of several months, I wrote him. He was surprised to find the position of things and to know the facts.

"After a brief period, another expert was sent out and we did some business. The man who put up the money in the first place is president of the company and I was the manager here, with the above results; but, owing to my other mining interests, I resigned. The company is still working and shipping.

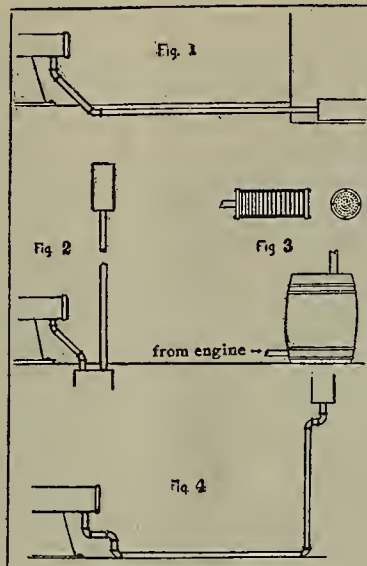
"I send you herewith two photographs—one with the hill in the background. In the one of the other hill you will note the men and tents on top. That has an altitude of 6500 feet. There is turquoise on top of it. There's where we worked in the winter, in about as rough a section as you ever walked over. There was hardly a place big enough for a man to spread his blankets on. I had twenty-five men at work there at \$3 to \$3.50 per day. This is not written for notoriety, but may be of interest to you."

THE International Mining Congress will hold its fifth annual meeting at Butte, Mont., September 1 to 5. Among the contributors of papers to be read and discussed are the following: F. H. Newell, chief hydrographer; W. H. Weed and W. Lindgren, geologists; R. H. Chapman, topographer, all representing the U. S. Geological Survey; Prof. A. T. Holmes, State Geologist of North Carolina and chief of the Mineral Department of the St. Louis Exposition; Prof. E. A. Smith, State Geologist, University of Alabama; Prof. R. B. Fulton, University of Mississippi; C. J. Moore of Cripple Creek, Colo., and others; president, E. L. Shaffner, Cleveland, Ohio; secretary, I. Mahon, Carlisle, Pa.

Gasoline Engine Exhaust Pipe.

One trouble in the use of gasoline engines is to overcome the noise of the exhaust. A contemporary suggests a plan as follows:

The odor of the burned gases is disagreeable, requiring considerable length of pipe to remove them, and increasing the back pressure. The evil of long piping can be overcome by making the pipe large, and with 45° elbows instead of 90° elbows, as shown



in Fig. 1, given herewith. The fewer bends the better.

The end of the pipe should not be below a window or near enough to the ground to annoy pedestrians. An elevation of 10 to 15 feet usually is sufficient. The open end of the pipe never should be placed where dirt or sand can be sucked into the cylinder, with certain damage to the cylinder and piston from grinding by the grit.

Exhaust mufflers are attached when the noise of the explosions is annoying. The construction of the ordinary exhaust muffler is shown in Fig. 3. A dozen perforated cast iron plates are held together by four iron rods. The inner plates are grooved to fit together. When the perforations in the plates have been stopped up by long use or feeding too much lubricating oil, the plates should be taken apart and heated in a wood fire until the grease has been burned off. A barrel loosely filled with bricks makes a cheap and practical muffler. A short length of pipe should extend up from the cover of the barrel.

A drip cock should be placed at the lowest point of the exhaust pipe near the engine, to drain any moisture which may collect in the pipe during the night by condensation, and run back into the engine when it is started.

Fig. 4 shows a pipe with too many turns. When many bends are unavoidable, and the pipe is long, the remedy, aside from making the pipe large, is to put in an exhaust pot, as shown in Fig. 2. An exhaust pot is a large cast iron vessel, placed as close to the engine as convenient and buried in the ground. The larger the capacity of the pot in comparison with the size of the engine cylinder the more effective is it, not only in diminishing the back pressure, but in silencing the noise of the exhaust.

Never lead the exhaust pipe close to wood or other material likely to ignite, as the pipe sometimes becomes hot enough to char, and may start a fire.

Platinum.

Washington advises as to the effect that a report upon the production of platinum in the United States in 1901 has been prepared for the United States Geological Survey and will shortly be published. The output during the year aggregated 1408 ounces of crude platinum valued at \$27,526, as compared with 400 ounces valued at \$2500 in 1900. The production for 1901 is the largest since the statistics have been compiled in 1880.

"The supply of platinum in the United States in recent years has been obtained as a secondary product from gold placer deposits in Trinity and Shasta counties, California. The occurrence of the metal has been reported in many other gold placers of California as well as in Washington, Oregon, Idaho, Montana and Alaska, but the deposits have not been sufficiently rich to place the extraction of the metal on a profitable basis, although eventually in the States named it is thought it will be developed in larger quantities.

"The most noteworthy feature of the platinum industry in the United States during 1901 was the discovery of the metal in the copper ores of the Rambler mine, near Encampment, in the Medicine Bow mountain, of Albany county, Wyoming.* As a result of this discovery the Survey calls attention to the im-

*See editorial note, page 99.

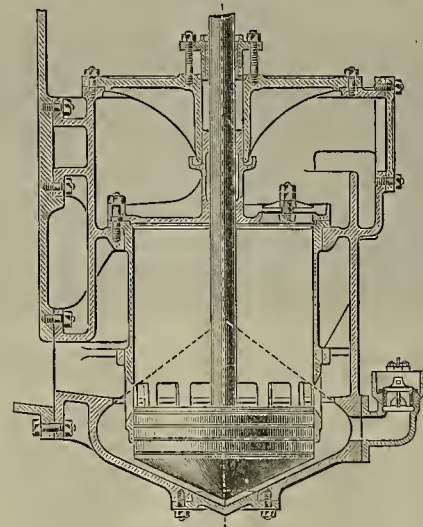
portance of examining all copper ores for metals of the platinum group.

"The imports of platinum during 1901 were valued at \$1,695,895, as compared with \$1,762,020 in 1900. The world's annual production of platinum for the last few years has ranged between 160,000 and 170,000 ounces, of which, as far as can be ascertained, Russia supplied at least 150,000 ounces, the remainder being obtained mainly from South America.

"During the last two years the price of platinum has steadily advanced from its lowest point in 1895 of \$10 an ounce to \$21 per ounce, which was reached in the latter part of 1901. The demand is in excess of the supply, and it is believed the price will continue to advance."

The Edwards Air Pump.

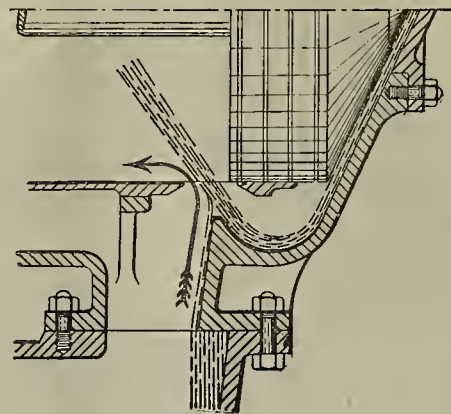
The Edwards air pumps are of a unique construction. It will be seen from the illustration that the Edwards air pump uses no induction valves, either in the suction chambers or in the pistons, this form of air pump being known as the suction valveless type, the only valves being in the discharge plates, where they are readily accessible. In the action of the Edwards pump, the condensed steam flows continuously by gravity from the condenser into the base of the



pump, and is there dealt with mechanically by the conical bucket working in connection with a base of similar shape. Upon the descent of the bucket the water is projected silently and without shock at a high velocity through the ports into the working barrel. The rising water is followed by the rising bucket, which closes the ports, and, sweeping the air and water before it, discharges them through the valves at the top of the barrel.

In this pump the speed of the water corresponds to the speed of the bucket, and the pump, having a small and regular quantity of water to deal with at each revolution, is designed to work at high speeds.

In the design of these pumps clear air inlets are



maintained through the mechanism, as herewith shown. In the Edwards pump the question of satisfactorily dealing with the air is considered as of primary importance. Under ordinary working conditions, when the bucket descends and the ports open, there is no obstruction between the condenser and the pump and the air has a free entrance into the barrel, while immediately afterward the water is injected into the barrel at a high velocity, the intent being that instead of obstructing the entrance of the air, the water tends to compress that already in the barrel, and to entrain or carry in more air with it.

The Wheeler Condenser & Engineering Co. of New York, for whom Chas. C. Moore & Co. are the Pacific coast agents, control the sole rights to manufacture these pumps in America. Chas. C. Moore & Co. say they have put in a large number of these pumps in plants lately constructed on the Pacific coast, and that the results are satisfactory throughout.

Electric Power in Quartz Mining.

At the sixth annual convention of the Pacific Coast Electric Transmission Association in San Francisco C. O. Poole, manager Standard Electrical Co., read a paper on the economy of electric power in quartz mining, which appears, handsomely illustrated, in the current issue of the Journal of Electricity, Power and Gas. Mr. Poole's paper was confined more particularly to mine practice in Amador and Calaveras counties, Cal. A condensation of the article is appended:

The ore in this locality is low grade, ranging from \$2.50 to \$6 per ton. Until recently the source of power at these mines has been steam and water power. The water wheels are working under heads varying from 160 feet to 520 feet. Water power under the last named head, at the prices now charged there, is about equivalent in cost to electric power at \$6.50 per H. P. per month. The uses of power at a mine are varied, and in applying electric power each case is a study by itself. The principal uses consist in driving stamps, concentrators, air compressors, sawmills, blowers, pumps and hoists.

The fuel used for steaming purposes is principally wood and fuel oil. Coal has been used, but not to any great extent. A cord of dry pine wood, which is the variety of wood used in that section, weighs approximately 2000 pounds. Its contents measure 128 cubic feet, of which about 56% is wood and 44% is space. The composition of average air-dried wood, which carries 5000 British thermal units per pound, is as follows:

	Per Cent.
Carbon.....	37.50
Hydrogen.....	4.50
Oxygen.....	30.75
Nitrogen.....	.75
Ash.....	1.50
Hygrometric water.....	25.00
Total.....	100.00

Given the heat units in a pound of wood and the pounds of wood per cord, let us now proceed to demonstrate the cost of steam power with wood for fuel.

A pound of saturated steam at 90 pounds gauge pressure contains 1215 heat units. If the feed water, after passing through an exhaust heater, has a temperature of 150° F., then the actual heat units absorbed by each pound of water evaporated will be 1215 - 150 = 1065 British thermal units. The theoretical evaporation of a pound of water under these conditions will be $\frac{9000}{1065} = 4.69$ pounds, which are the heat units contained in a pound of wood, divided by the heat units required to evaporate a pound of water.

Assuming a boiler efficiency of 65% (which is as good as can be expected when working under variable loads), the actual evaporation under working conditions will be $4.69 \times .65 = 3.048$ pounds of steam per pound of wood. A cord of wood, then, weighing 2000 pounds will evaporate $3.048 \times 2000 = 6096$ pounds of water into steam at 90 pounds gauge pressure.

The ordinary simple non-condensing steam engine will consume 30 pounds of steam per horse power hour, working on unsteady loads. If, then, we divide the total pounds of water evaporated by a cord of wood into the pounds of steam consumed per horse power hour by the engine, we get $\frac{6096}{30} = 203$ horse power hours.

Taking the cost of wood at \$5 per cord, the cost per horse power hour will be $\frac{\$5}{203} = \0.0247 . As there are 720 hours in a thirty-day month, the cost per horse power per month will be $\$0.0247 \times 720 = \17.78 . While it is possible to do somewhat better than this with a plant working under favorable conditions, it will be found in general mining practice that the price is rather above this figure than below it.

Through J. C. Kemp Van Ee of the Royal Consolidated mine, Calaveras county, is presented the results of an efficiency test of a steam plant working

Type of engine.....	Atlas Corliss
Diameter of cylinder.....	14.5 inches
Stroke of piston.....	36 inches
Revolutions.....	.90 per minute
Boiler pressure.....	100 pounds
Terminal pressure.....	23 pounds
Mean effective pressure.....	34.161 pounds
Horse power.....	90
Steam consumed per horse power hour.....	23.06 pounds

under almost ideal conditions. The plant in question is driving a 40-stamp mill, consisting of twenty stamps weighing 1050 pounds each and twenty stamps weighing 800 pounds each, all with a drop of 5½ inches, making 110 drops per minute. The mill contains twelve concentrators in addition to the mill equipment, and the engine drives a 7 K.W. generator for supplying lights for the mill and houses. The results of this test follow:

EVAPORATION TEST OF SECOND GROWTH PINE WOOD.—Type of boiler, horizontal tubular; size of boiler, 66 inches diameter by 16 feet long; number of tubes, 98 3-inch tubes; heating surface of shell equals 132

square feet; heating surface of tubes equals 1230 square feet; total heating surface equals 2552 square feet; grate surface, 25 square feet; ratio of heating surface to grate surface equals 54.5 to 1; duration of test, 10 hours; amount of wood burned equals 24 cords; weight of wood burned equals 9331 pounds; weight of wood per cord equals 3554 pounds; total water evaporated equals 25,124 pounds; temperature of feed water, 60.8° F.; steam pressure, average gauge, 101.4 pounds; water evaporated per pound of wood, actual conditions, equals 2.693 pounds; water evaporated per pound of wood from and at 212° equals 3.224 pounds; quality of steam, practically dry.

While the test shows an evaporation of 3.224 pounds of water per pound of wood, the results actually obtained in practice are about 12% better than this, as the feed water is heated by the exhaust steam from the engine and enters the boiler at 198° F. Owing to the difficulty of arranging the weighing device for handling the feed water after passing through the heater, we were forced to use cold water, cutting the heater out of service. Adding this 12%, the evaporation is 3.61 pounds of water per pound of wood.

The heat units imparted to the water were $1117 \times 25,124 = 28,063,508$. Assuming an efficiency of 70% for the boiler, the total heat units given out by the wood was $\frac{28,063,508}{70} = 40,090,725$, and the heat units per pound of wood amount to $\frac{40,090,725}{9331} = 4296$, which is about right for that class of wood.

The power cost for running this mill with wood at \$4.25 per cord is as follows:

Fuel cost per horse power hour.....	\$0.0103
Labor cost per horse power hour.....	0.0023
Total.....	\$0.0126

Making the cost per horse power per month amount to \$9.07.

The results obtained from this plant are surprisingly good, but it must be borne in mind that it is a very efficient plant, which is working under the most favorable conditions. The boiler and engine are properly proportioned for the duty, the load is constant, the engine cuts off at the proper point to obtain the best results from the expansion of the steam, and the feed water is heated to a remarkable degree. I think it will be acknowledged that a plant operating under the fluctuating conditions of the average mining load, such as hoists, air compressors, pumps, rock crushers, sawmills, etc., that the consumption of steam per horse power hour will reach from 30 to 35 pounds instead of 23, as shown by the test data above, and the efficiency of the boiler will be below 70%.

A good quality of steam coal yields 13,000 British thermal units by oxygen calorimeter, the approximate analysis being as follows:

	Per Cent.
Moisture.....	3.50
Volatile combustible matter.....	34.27
Fixed carbon.....	51.23
Ash and waste.....	8.00
Total.....	100.00

This quality of coal can be landed at the mines for about \$13 per ton of 2240 pounds. Under the same conditions upon which wood was figured the cost of power, using coal for fuel, will be approximately as follows:

Theoretical evaporation = 12.2 pounds of water per pound of coal. Actual evaporation under working conditions = 7.93 pounds of water per pound of coal, which = 17,763 pounds of steam per ton of coal. Horse power hours per ton of coal = 592; cost per horse power hour = \$0.022; cost per horse power per month = \$15.84.

While this cost appears somewhat less than wood, yet for general mining work wood has many advantages over coal.

We now come to the real competitor of electric power in California—wood and coal having fallen an easy prey; but oil offers a more stubborn resistance, especially in the valleys or at tide water, where it can be landed to the customer at a price of 67 cents a barrel. In the mining districts, however, where the transportation rates are high and oil costs \$1.50 per barrel, it is not such a formidable foe. It is well, however, for the transmission people to keep informed on the oil situation, for oil has come to stay in California.

A barrel of 16° B. oil weighs (allowing for wastage) 330 pounds, delivered; heat units per pound = 18,000; theoretical evaporation = 16.9 pounds; actual evaporation—boiler efficiency—at 65° = 10.98 pounds; pounds of water evaporated per barrel of oil = 3623; horse power hours per barrel of oil = 120.7; price per horse power hour, oil at \$1.50 per barrel, = \$0.0124; price per horse power per month = \$8.93. This result can be obtained under the most favorable conditions.

At the Lightner mine, Calaveras county, electric power has been used exclusively for several years. A 150 H. P. motor drives a two-stage compressor 13x21 inches, 22-inch stroke, and running at seventy-five revolutions per minute. The sawmill, a pump and a blower are also driven by the same motor. The

relief pipe from the air receivers is connected to the steam boilers, two of which act as additional receivers, and another one of them is being used as a reheater. About one cord of wood is burned per day in reheating. There is operated a 60-stamp mill, which is driven by a 100 H. P. induction motor. A 20 H. P. motor drives the rock crusher, and a 5 H. P. motor is used for operating a telpherage system for carrying sulphurets to the chlorination works. All the hoisting is done with compressed air, as is also the lifting of all the water, which is taken from the 600-foot level. In addition to this work seven 3¼-inch drills are supplied with air from the same compressor. The total power bill for January, 1902, was \$1457.50, including the cost of the wood used for reheating purposes, which makes the power cost per ton of ore milled to be 21 cents, including all power charges.

The old Keystone mill, Amador county, consisted of forty 725-pound stamps, 96 drops, 7.5-inch fall, and sixteen concentrators. The total power required was 85 H. P., or 2.12 H. P. per stamp. When this mill was operated by steam, using pine wood for fuel, seven cords per day were consumed. This at \$5 per cord = \$35 per day, or \$1050 per month. Add to this the wages of two firemen = \$1200 per month. The cost of electric power at \$6.50 per horse power per month = $85 \times \$6.50 = \552.50 , showing a saving of \$647.50 per month.

This mill has recently been increased to sixty stamps and twenty-four concentrators. The new stamps are 1000 pounds, making 100 drops, 5.5-inch fall. The mill is now driven by a 150 H. P. induction motor. They have also installed at this mine a 300 H. P. induction motor for driving a two-stage air compressor, and a 30 H. P. motor for operating the sawmill, making a total installation of 480 H. P. This mine is also using compressed air for drills and hoisting.

Measurements made on the Central Eureka mill showed a consumption of 46 H. P. for twenty 850-pound stamps, 90 drops, 6.5-inch fall, including eight concentrators. This is at an average of 2.3 H. P. per stamp. The mill was driven by a 50 H. P. induction motor. Since this data was obtained the owners have increased the capacity of the mill to forty stamps, and have installed a 100 H. P. motor to drive it. Preparations are now being made to install an air compressor, to be driven by the 50 H. P. motor taken from their mill, and when this is done compressed air will be used for drilling and hoisting. The total electrical installation will then be:

	H. P.
Mill.....	100.0
Compressor.....	50.0
Rock crusher.....	12.5
Blower.....	7.5
Total.....	170.0

The Oneida mill is running sixty 1100-pound stamps, 94 drops, 7.5-inch fall. The power required to run the mill, including thirty concentrators, is 175 H. P., or 2.91 H. P. per stamp. The stamps are driven by a 150 H. P. induction motor, and the concentrators are driven by a 30 H. P. motor. This mine is also using a 50 H. P. motor on its rock crusher, a 75 H. P. motor in its sawmill and a 125 H. P. synchronous motor driving its air compressor. It is preparing to install a 125 H. P. motor in the mine for driving a pump, which will make a total installation of 555 H. P. The total power cost per ton of ore milled at this mine is about 30 cents. The cost of power for the mill when all the stamps are run continuously is \$1137.50 per month. This mine is hoisting and pumping by steam, with oil for fuel.

Mr. Poole's article is considerably condensed, the intent here mainly being to produce the figures and detail, which are always of interest to mining men.

THE pumping station of the Butte Water Co. at Divide, Mont., pumps water from the Big Hole river to a reservoir 800 feet above, from which it is conducted through 28 miles of pipe to Butte. From low water in the river to the level of the inlet chamber at the South Fork reservoir is 787 feet. The addition of the friction head for the full capacity of the line gives 840 feet as the total dynamic head. This pressure, while not unusual for mining or oil line pumps, is greater than can be found in any water works plant of equal capacity. The water is taken from a stream flowing into the Gulf of Mexico, carried across the crest of the continent, and delivered on the banks of a tributary to the Pacific.

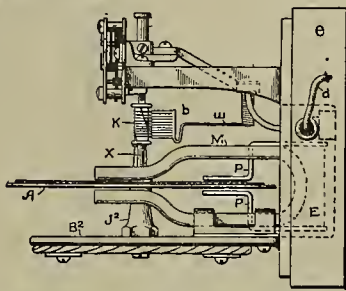
Work on the Central Pacific Railroad cut-off across the Great Salt Lake, Utah, is proceeding rapidly. On the Ogden side the roadbed has been finished for a distance of 8000 feet out into the lake and the track laid. After going 2000 feet farther the driving of piles for the trestle across the deep part of the lake will be commenced. Ten pile-drivers will be used for the work.

A LOAD of 8440 net tons of iron ore is the record made by the schooner John Smeaton, sailing from Duluth, Minn., August 5. The previous greatest steamer record was 7417 gross tons.

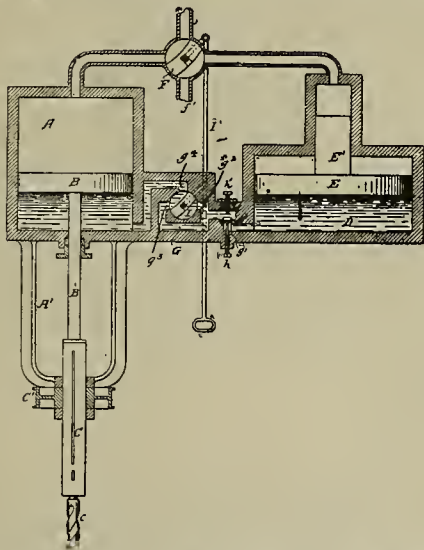
Mining and Metallurgical Patents.

Patents Issued August 12, 1902.

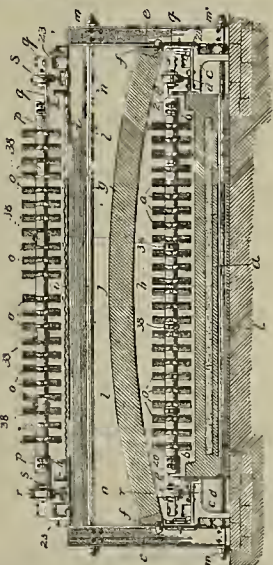
Specially Reported and Illustrated for the MINING AND SCIENTIFIC PRESS.

ELECTRIC METER.—No. 706,612; Elihu Thomson, Swampscott, Mass.

In an electric meter, retarding magnet system comprising one or more magnets producing substantially constant magnetization and electromagnet, winding of which is connected in meter circuit, magnet being so proportioned that at or near full load its magnetization will become substantially constant.

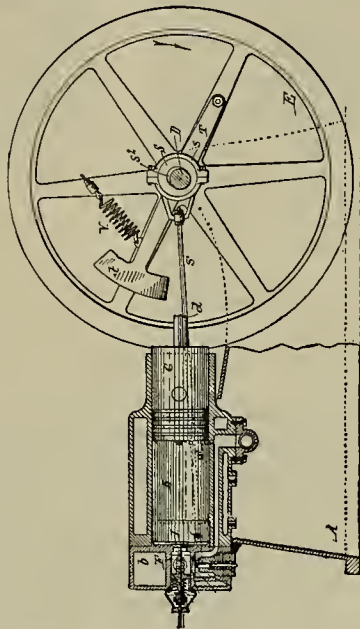
FLUID PRESSURE OPERATED TOOL.—No. 706,688; J. V. W. Reynders and W. T. Sears, Harrisburg, Pa.

Combination of drill or other tool with feeding device therefor, comprising cylinder having within it piston, liquid reservoir, means for subjecting liquid in reservoir to pressure of elastic fluid, means for operatively connecting liquid reservoir and piston cylinder whereby liquid under pressure of fluid may be caused to act upon one side of piston to move it in one direction, with means for connecting portion of cylinder on other side of piston with source of fluid under pressure, whereby piston may be moved in opposite direction, tool being free to turn independently of piston.

ORE ROASTING FURNACE.—No. 706,756; D. C. Jackling, Republic, Wash.

In ore roasting furnace of class described, combination of ore roasting hearth, pair of tracks arranged parallel with and outside of hearth, cooling

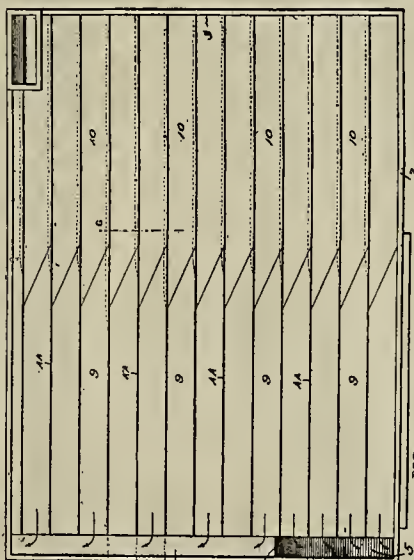
hearth arranged parallel with and above ore roasting hearth, pair of tracks arranged parallel with and outside of cooling hearth, plurality of rabble trucks provided with rabble mechanism for agitating moving material along both tracks, pair of link belts connecting rabble trucks together in continuous manner, plurality of shafts provided with sheave and sprocket wheels for holding and driving pair of link belts, pair of side blocks supporting one shaft, countershaft connected with one shaft to transmit power and motion thereto, means for driving countershaft, shipper mechanism for throwing driving means into and out of engagement with driving shaft, weighted chain or similar element connected with side blocks to hold link belts under tension and, should either or both belts break, contact shipper mechanism and disengage driving means from countershaft.

FUEL VALVE FOR GAS ENGINES.—No. 706,916; J. B. Fenner, Buffalo, N. Y.

Combination with cylinder and piston therein, of chest arranged at end of cylinder having valve chamber communicating with cylinder, socket extending from outer side of chest into valve chamber, fuel conduit opening into side of socket; valve case fitting in socket having ports in side which communicate with fuel conduit; hollow rock valve arranged in case having ports in side which register with ports of case opening at its inner end into valve chamber of chest.

DRILL ROD GRAB.—No. 706,872; J. H. Adams, Fullerton, Cal.

In drill rod grab, combination with outer casing, rigid jaw secured therein provided with plurality of teeth, coinciding sliding jaw arranged adjacent rigid jaw provided with teeth, collar on upper end of sliding jaw, guide pin projecting from collar, spring surrounding pin adapted to bear against collar to retain sliding jaw normally against upward movement.

ORE CONCENTRATOR.—No. 706,793; H. S. Bailey and W. E. Wild, Denver, Colo.

In ore concentrator and separator reciprocating,

concentrating table provided with plurality of concentrating surfaces of equal lengths in step form, each stepped concentrating surface comprising inclined reservoir section and inclined ore washing classifying section, sections being arranged to intersect one another at points intermediate of ends of stepped concentrating surfaces, raised ridge or dam at point of intersection, concentrates passage past dam arranged to connect lowest portions of inclined surfaces with one another, pocket in lowest side of inclined surface at and adjacent to head end of table blending into concentrates passage having dams arranged and adapted to guide concentrates from reservoir section away from dam below and in substantially different direction from that in which ore pulp flows, having dams arranged across table in any suitable direction.

MEANS FOR UTILIZING COMPRESSED AIR.—No. 706,653; E. Hayward, Chicago, Ill.

Combination with steam boiler of double-acting air compressor, means for actuating compressor, pipe connected therewith adapted to deliver compressed air to dome of boiler, means for heating compressed air before delivery in dome, comprising coil in pipe located in and transversely of furnace of boiler valve in connection acting to regulate flow of compressed air to boiler.

Mustard Gold.

In connection with the mention in the issue of Aug. 2 of mustard gold being an indication of the existence of telluride, the question is asked simultaneously by three Montana and two Arizona subscribers: "What is mustard gold?"

A. G. Holroyd, speaking of finding telluride of gold in Kalgoorlie, Australia, says:

"This peculiar form of gold, resembling clay, was first brought under my notice in 1894, while acting as manager of the Austral Otis Metallurgical Works in South Melbourne. It came from the Hannans Star G. M. Co., and I was told it occurred in a vein varying in width from a pencil line to half an inch. Upon examining this clay-like gold under the microscope I found it consisted of the minutest particles, rounded globules, and filigreed, conglomerated together, resembling a sponge filling up similar shaped cavities and veins to those occupied by the telluride of gold in the sulphide ores. If this sponge gold is pressed with the blade of a knife (being exceedingly soft and malleable) its metallic luster is at once apparent. This mustard or clay-like gold can be artificially obtained in the laboratory by dissolving a piece of telluride of gold with sulphuric acid very slowly. The tellurium is leached out, and leaves the gold in an exactly similar form to that which is found in nature here upon this field. This, among other reasons, led me to conclude that the mustard gold in a mine here is an indication of the presence of telluride of gold at depth. The greater quantity of gold ores on the Kalgoorlie field carry mustard gold, and in most cases telluride of gold has already been found, in many cases very rich and in solid, hard country. I mention those mines in which I have already proved the presence of tellurium and those in which my experiments have proved to me that it will occur, and from the names mentioned it shows that telluride of gold is generally distributed throughout the field, and will be the eventual mainstay of the field.

"Another class of gold, 'sponge gold,' resembling mustard gold, but more spongy in appearance, having also a beautiful metallic luster, occurs upon this field. It resembles the most beautiful filigree work. This gold was found in large quantities in stoping from the 200-foot level to the 150-foot in the Great Boulder, and as much as seventy pounds of pure gold was obtained in one bunch of ore. This gold is also due to the oxidation of the tellurium, and at a depth large quantities of telluride of gold should be found. Under the microscope this gold presents the appearance of a mass of gold crystals (octahedron and dodecahedron), with brilliant faces and gold in filiform and arborescent shapes. There are evidently several other forms of tellurium besides calaverite—sylvanite, krennerite and native tellurium are among the number."

GAS ENGINES using blast furnace gas are to be built to supply blast to four of the new furnaces which the Lackawanna Steel Co. is building at Stony Point, near Buffalo, N. Y., the first example of this practice in the United States.

Mining Summary.

Specially compiled and reported for the
MINING AND SCIENTIFIC PRESS.

ALASKA.

The Nome Exploration Co. has bought of Cooper & Lane nine claims on Newton gulch, near Nomo, for \$30,000. The Nome Exploration Co. and the Pioneer M. Co. together have bought the Sugar claim, between Anvil and Dexter creeks, for \$50,000.

ARIZONA.

COCHISE COUNTY.

The Copper Buillon M. Co., at South Pass, is about to ship ore; a new working shaft will be sunk. The lower shaft begun some time ago will also be sunk. The main tunnel is in 1000 feet; about 3000 feet of work has been done.

At Willcox, the Old Terrible, a 20-stamp mill, capacity ninety tons per day, is in operation. The machinery will be run by a 100 H. P. Corliss engine; fuel, crude oil. The 60-ton smelter is expected to be in operation by October 1st. The ledge runs from 1 to 5 feet in width and carries gold, silver and lead values; average, \$28 to the ton.

The Copper Hill M. Co., Canada del Oro, 4 miles from Oracle, will put in a leaching plant, 100 tons daily capacity, and will build a traction engine road from the mine to Red Rock station, 24 miles. They have about 10,000 tons 5% carbonate and silicate ore blocked out.

F. L. Wright, superintendent of the Bisbee West, will put on next month seventy men. He is preparing to sink the main shaft to the 1200-foot level. There are 2000 feet of development work upon the property. The pump has a capacity of 200 gallons per minute.

J. G. Hearne, manager Black Diamond M. Co., in the Dragon mountains, near Tombstone, says the new smelter, 200 tons capacity, is completed. A gravity tramway 1½ mile long, to connect the mine and smelter, will be finished Oct. 1. The Black Diamond is a tunnel mine 800 feet higher up the mountain than the smelter. The tramway will be run from the lower of the four principal tunnels, which are all connected by winzes. The ore will travel by gravity from the stopes to the smelter.

GILA COUNTY.

P. J. Cole, superintendent of the Columbia Copper Co., has returned to Globe and work is to be resumed on the property.

A. C. Sieboth, at Queen creek, is having development work done on the Golden Eagle mine.

T. Kavanaugh, foreman of the Troy-Manhattan Copper Co., tells the Silver Belt that development of the properties at Troy is being carried on with seventy miners.

GRAHAM COUNTY.

The Shannon C. M. Co., near Clifton, has an output of about eleven tons of copper per day. The company employs Mexican labor and pays \$2.50 per day—an advance of \$1.

Supt. Molder of the Home C. Co., near Clifton, has 40 feet of gold ore which he says will average \$4. It is the company's intention to continue development and as soon as possible to build a stamp mill.

T. McNery, now at Pima, has a plan to drive a tunnel into Graham mountain at an elevation of 350 feet to develop water and minerals. Surveys have been made; the distance through is estimated at 12 miles. The company which proposes to do this is the Triumph Tunnelsite Co.

MARICOPA COUNTY.

Phoenix reports work progressing at the Rich Hill shaft of the Electra M. & M. Co., now 180 feet deep. The company now controls 4000 feet along the dike.

The News-Herald has from a reliable source that the proposed railroad from Congress Junction to the Colorado river will be built, and that it will be in operation during the year 1904, to be part of the Phoenix & Eastern Railway system. Ground will be broken during the next thirty days. The Phoenix & Eastern proposed route is between Phoenix and Benson, where it is expected that connection will be made with an Eastern trunk line. From Phoenix the tracks of the S. F. P. & P. will be used, under lease, as far as Congress Junction. From that point the western end of the system will run to the Colorado river, near Ehrenburg.

Sanders & Upton have bought the interests of C. F. Hathaway in the Angel and Arizona Bess mines, near Wickenburg.

At Phoenix the El Oro Dredging Co., S. B. Connor, A. S. Grant, W. S. Noyes of California; Wabash Con. M. Co., L. M. Goddard, W. C. Calhoun, F. C. Noble of Colorado; La California M. & M. Co., L.

Russell, F. S. Mallory, B. R. Ragland, have filed articles of incorporation.

MOHAVE COUNTY.

S. C. Bagg, manager New Comstock M. Co., Kingman, tells the Miner that in the drifts now being driven on the Catharine mine a new ore phase is developing. The ore heretofore has been gold-bearing entirely, but the new ore carries 100 ounces silver and \$50 gold to the ton.

PIMA COUNTY.

F. M. Hartman, manager Catalina Copper Co., upper Canada del Oro, has fifteen men doing development work. The ore on the dump averages 6% copper, \$2 gold and \$5 silver. The other mines in the Canada del Oro are not working at present. At Copper Hill the company is contemplating the erection of a leaching plant. The mines at Camp Condon will resume this fall.

SANTA CRUZ COUNTY.

The Copper Queen Co. is having 4,000,000 brick made at the rate of 48,000 a day at the yard, 12 miles northeast of Douglas.

YAVAPAI COUNTY.

Near Prescott the Anita M. Co. has the George process for treatment of copper carbonates; \$11,000 worth of machinery will be put in. The company expects to have 125 men at work.—The details of the transfer of the Cameron group to the Pages have been completed; a smelter is to be put in.—The Alma mine, Groom creek, has fifteen men employed in development.—On the 400-level in the Home Run mine, Groom creek, a vein of ore 2½ feet wide is struck, which carries \$30 per ton gold.—Superintendent A. J. Pickerd is running the Chicago mill. He has twenty-five men on the President.

W. D. Powell, general manager Black Rock G. & C. M. Co., will put machinery on the company's group of claims near Jerome.

Superintendent M. Bradley of the Lion G. M. Co., operating and developing the Bardshear mines on Cherry creek, is down 247 feet in the old shaft, having crosscut the ore shoot for that distance, and is sinking a new shaft which pitches with the vein and is down 170 feet from the surface. He has ore assaying \$20 per ton, quartz containing sulphides and brown hematite of iron.

In the trial run of the Aiken furnace at the United Verde mines it was worked for about six hours, when it was shut down. The trial was made on the gray copper ore as it was taken from the mine. Whether or not all the values will be saved remains to be seen after a more thorough test. The principal advantage claimed for the Aiken is that it melts ore without having to send it to the roast first; heat is supplied by oil.

A. Thorbecke, of Jerome, at Banning creek has six claims, the main ledge 3 feet wide; ore averages \$15 gold per ton.

The machinery for the concentrating plant of the Standard S. & R. Co. is at Val Verde, ready to be put in place; daily capacity, eighty tons. A 10-stamp mill to handle the free milling ore will be run in connection with the concentrating plant. The company has ore awaiting treatment.

The Morning Star group, 8 miles east of Jerome, is being developed. The ore runs 7% copper.

Prescott reports a 21-pound gold brick from the Braganza Co.'s Henrietta mine, the second cleanup from the mill, running on Henrietta ore. The company has fifty-five men at work, has ample water and is running its mill steadily. The new shaft is over 300 feet deep.

M. S. Taft of the Victor mine, near Walker, reports the working shaft down over 300 feet, the ore averaging \$20 gold per ton.

W. J. Martin, superintendent Monarch M. Co., is working the Mocking Bird group, Cherry Creek district, and sinking a 500-foot shaft on the ledge. About 40% of the ore is free milling.

A rich strike is reported in the First Home mine of the Merchants M. Co.

The Val Verde smelter is making matte steadily.

C. Timmons has the double-compartment shaft on the Copper King mine down nearly 300 feet. A 25 H. P. gasoline hoist is in operation.

The Yavapai Placer Mines Co. is pushing work on the properties near Lynx creek.

The Sultan mine is taking ore from a vein 3½ feet wide which averages \$20 a ton. The Big Bug G. & C. M. Co. has the double-compartment shaft on the company's property down 200 feet. Forty thousand gallons of water a day has been pumped from the mine.

G. P. Harrington, manager Tiger Gold Co., at Crown King, has men developing the Ora Bella group and has large bodies of sulphide ores of a concentrating character.

The Last Chance, Thumb Butte district, is being worked by E. A. Haggott,

who is sinking a 500-foot shaft and putting the mill in order.

The Federal M. & M. Co., in the Cherry Creek district, will develop its property at once. The company has in a 30-foot shaft and tunnel a ledge which averages \$30. A mill will be put up.

W. A. Clark of Montana arrived at Jerome on the 17th. The United Verde mine is still on fire. Four levels are now burning. A Chicago man is at work with an apparatus designed to check the further progress of the fire, while it is said to control and extinguish fires in the upper levels. Several hundred men have been laid off on account of the shutting down of the mine and smelter.

YUMA COUNTY.

At Yuma, M. Nugent from Kofa, has a \$50,000 gold brick, representing the past thirty days' cleanup of the King of Arizona, which he brought in for shipment.

CALIFORNIA.

AMADOR COUNTY.

At the Hoffman mine, owned by W. F. Detert, a tunnels being run to tap the ledge at a depth of 1400 feet.

The Del Monte tunnel was advanced during July 80 feet; the entire length of this tunnel up to Aug. 1st was 243 feet.

J. F. Parks, superintendent Kennedy and South Eureka mines, tells the Jackson Dispatch that exploration work is in progress on the 2400 and 2500 foot levels from the East shaft. In the main shaft at the South Eureka mine a depth of 250 feet below the 2000 foot level has been attained. The mill is busy on rock from the levels of the 2000-foot station.

In the Onaida mine Superintendent Hampton has the pump in operation at the 1300-foot station, run by a 100 H. P. direct-acting electric motor. There are six double-acting plungers; the pump forces 200 gallons of water a minute 1300 feet to the surface. A tank has been cut into the solid rock, 80 feet in length, 22 feet wide and about 8 feet high, which will hold 105,325.6 gallons water. A station is being cut at the 2000-foot level, and a smaller pump will be put in there to raise the water that accumulates in the tank. As soon as the station is cut and the preliminary work completed, sinking will be resumed and the shaft put down several hundred feet lower. Forty stamps in the mill are kept busy dropping on ore from the 1200, 1400, 1800 and 2000 foot levels.

The Rhett Con. G. M. Co. has its mill at the Bay State mine running on good ore from the 850-foot level, north. Development work is being prosecuted on the Bay State and Kretcher veins. The south drift at the 850 Bay State vein is in over 450 feet, its face being in sulphurets. At the 700 Kretcher vein a drift is being run north on the vein and a raise put up in the ore. The management hopes soon to sink a new vertical shaft on the Rhett mine, south of the Bay State.

BUTTE COUNTY.

The Golden Trout mine is 35 miles from Oroville. A stamp mill is in operation on ore from the Birmingham drift.

CALAVERAS COUNTY.

W. C. Potts, superintendent Sierra Railway, says the railroad will open for passenger traffic between Angels and Jamestown Oct. 1.

EL DORADO COUNTY.

In the Mt. Hope mine, Grizzly district, at a depth of 225 feet, is found a body of ore.

INYO COUNTY.

The Golden Argus M. & M. Co. is operating in Snow's canyon, about 20 miles from Ballarat, and is putting up a 5-stamp mill. They will put in concentrators and a cyaniding plant.

KERN COUNTY.

The Little Butte mine, near Randsburg, has resumed. P. H. McMahon, superintendent Butte Lode and general manager Con. M. Co., has charge.

The Oil-Well Drillers' Union of California is organized for the purpose of making a uniform scale of wages in the field. About a year ago drillers received \$7 to \$8 per day; now they are receiving from \$4 to \$5. The union will probably include 250 men.

The Standard Oil Co. has ordered twenty more 35,000-barrel tanks for Kern river, making eighty-five tanks, with a capacity of 2,975,000 barrels. The Southern Pacific is placing seventy-two of these tanks at various points along its lines.

The Gold Peak group of gold mines, near Bakersfield, has been acquired by W. F. Snyder for the Western Exploration Co., of which he is president and manager. Superintendent Rader says to secure the Gold Peak \$200,000 was required, and of this the final payment has been made by Manager Snyder.

MARIPOSA COUNTY.

Surveys are being made for the new electric power plant to be put in on the

Merced river, 15 miles above Coulterville, and will be completed next November. During the following season a dam of masonry will be constructed. The fall of water will be 300 feet and the ditch 9 miles long. Electric power will be developed for the operation of mines in that section and also for sale to consumers in the valley. It is a \$1,000,000 proposition.

MONO COUNTY.

In the Standard Con. mine at Bodie, for the week ending August 9, at the mill 427 tons of ore were crushed; average assay vanner tailings, \$5.83; concentrates produced, 1.40 ton; assay value, \$151.10; amalgam produced, 1553 ounces; assay value, \$2.44 per ounce.

NEVADA COUNTY.

Work on the Pennsylvania resumed on the 18th. About twenty-five men were put on. Superintendent B. Ople hopes to increase the number later.

L. I. Ogden will build a mill at the Pine Hill mine, near Wolf.

Near Grass Valley, on the 19th, fire destroyed the plant of the Conion M. Co.; loss, \$20,000; insurance, \$5000. The mine is owned by Eastern men principally and employed twenty-five men. It had a complete plant and was just beginning to make money for the stockholders, after two years' hard work in exploring. Next week they would have started to sink 1000 feet.

J. D. Huffman has returned to San Francisco, after ore sampling the Pennsylvania mine. The result of his estimation will be placed before the commission appointed to decide the damage suit of the Pennsylvania against the W. Y. O. D.

PLACER COUNTY.

At the Gold Reef mine, at Shady Run, T. H. Wilkins has a pay streak 50 feet from the main tunnel, and has since cross-cut it 140 feet. He is blocking out the pay streak and next month will be breasting. While tunneling in the placer mine a free-milling gold quartz vein was cut through. A stamp mill is projected.

Superintendent F. Schulze, at the Big Hill mine, Canada Hill, owned by the Golden West Con. M. Co., has men at work in the lower tunnel into the channel to drain it. The 1100 feet to reach the channel can be done by Jan. 1, 1903.

PLUMAS COUNTY.

M. C. Miller of Minneapolis, who owns the Miller quartz mine, has bought of J. O. August the Mill creek gravel and quartz property, 2 miles south of Quincy.

SAN BERNARDINO COUNTY.

An option on the Brick Consolidated at Vanderbilt has been secured by W. B. Thompson of Utah.

SHASTA COUNTY.

Conflicting statements come from Redding as to whether the Balaklala copper claims, adjoining the Mountain Copper Co.'s property, have been bought or not. For some time H. Spence has been operating a battery of diamond drills by which the Western Exploration Co. has been prospecting the Balaklala group under a \$750,000 option, and with satisfactory results. The statement has been positively made that the deal was a go, that the money was to be paid and that the new owners would immediately develop on a scale commensurate with the extent of the deposit. But the Searchlight says:

"The Kimberley syndicate which holds a bond on the Balaklala group of copper mines, near Kennet, has folded its tent like the Arab and as silently stolen away. All of the diamond drills and other prospecting apparatus were shipped at Kennet en route to the State of Nevada. Development work at the mines was suspended a week or ten days previous to shipment.

"Several explanations have been advanced as a reason for the withdrawal of the Kimberley people the most plausible one being the inability of the various copper mining companies to get together on a common basis, which would mean a single smelting management and other economies necessary to profitable production at prevailing copper prices.

"Several fruitless attempts have been made to merge the greater undeveloped properties on the copper belt with the Bully Hill mines and to utilize a common plant on the Sacramento river near Kennet, and it was understood in well-informed circles that nothing would be done toward production until a merger of various interests could be arranged. It would now appear that this information was well founded.

"An unconfirmed report is in circulation that there has been a transfer of interests and that another company will take up where the Kimberley syndicate left off. The Kimberley bond on the Balaklala called for payments aggregating \$650,000."

It is believed, however, that the deal will go through, ultimately, and another big producing copper property be added to Shasta's mining enterprises.

The Bliss mines on Squaw creek are to

be worked again. C. C. Bush is agent at Redding.

SIERRA COUNTY.

The Taber G. M. Co., San Jose, S. P. Hatcher secretary, at Gibsonville, has a development of 3700 feet of tunnel work and has struck the ancient river channel.

SISKIYOU COUNTY.

J. E. McBride, who owns a mine in the Humboldt district west of Yreka, will put on a 5-stamp quartz mill.

At Hornbrook the Jillson mine is in operation. Mattern's 10-stamp mill is about completed. Manager Williams will crush ore from the Indian Girl mine in the new mill.

The Carlock & Morrison quartz mine, in Quartz valley, is paying; thirty men are employed. Being a blanket ledge, it is more difficult to get the quartz out. The Punch Creek quartz mine, on Humboldt, yields good returns. A 3-foot ledge in the new tunnel keeps the McCook mill running day and night crushing ore.

The Journal hears that the dredger in Yreka creek is taking out considerable gold—\$1000 being realized in five days.

SONOMA COUNTY.

J. E. Heald has bonded the Rainbow copper mine, near Cloverdale. The Shasta County M. Co. will take hold of the property and develop it; price, \$50,000—\$3000 to be paid in sixty days, the remainder in installments running over a period of two years, development work to commence within sixty days.

TEHAMA COUNTY.

There is a deposit of sulphur 50 miles east of Red Bluff, between Battle Creek Meadows and Morgan Springs, which is just located by W. M. Smith and others of Red Bluff.

TRINITY COUNTY.

At the Globe mine, near Dedrick, Superintendent Skinner has twenty men employed.

At the Brown Bear mine, at Deadwood, sixty men are employed.

TUOLUMNE COUNTY.

The Jumper Gold Syndicate, a British corporation, has brought suit against P. G. Gow, late manager of the syndicate Jumper and New Era mines, for an accounting.

Near Jamestown, the machinery for the new 10-stamp mill of the Republican mine is on the ground. A contract to sink the shaft to the 600 level has been let. The stamps in the old mill are dropping on good ore.—The Meighan G. M. Co. has incorporated; J. M. Meighan, F. M. Leland, J. P. James, H. Sussman, W. G. Luckhardt.

At the Bell mine, near Tuttle town, the shaft, 400 feet in depth, is being retimbered and will be sunk 200 feet deeper. A new gallows-frame is to be erected.

At the Hunter, or New Era mine, ten men are sinking.

W. H. Martin will work the Lady Washington. The tunnel is in 90 feet; an air compressor is to be installed and a pipe line run.—The Dreisam shaft is down 400 feet.

C. W. Gammon has deeded to the Eclipse G. M. Co. the Markham mine.

Peterson & Ogden have sold to Murphy & Davis the Telephone quartz mine, 5 miles from Columbia.

COLORADO.

BOULDER COUNTY.

Near Eldora three groups—the Revenge, New Eclipse and Kittie—have been consolidated under the control of the Revenge Development Co., which owns twenty claims showing mill assays of \$8 in gold. They intend to drive a tunnel from a point 75 feet above Boulder creek in the main Boulder canyon 6000 feet into Bryan mountain, cutting these claims at a depth of 600 to 900 feet.

The Enterprise mine, on Spencer mountain, under the management of J. Phillips, is producing ore running \$35 per ton.

Boulder reports that W. Brainard, driving the Alaska tunnel, near Ward, has opened in the heading, 1800 feet from the portal, a body of sulphide ore, carrying \$69 per ton in gold and associated values. Ex-Secretary of the Treasury Lyman Gage, who is interested in the property, was present when the strike occurred.

CLEAR CREEK COUNTY.

At Yankee Hill the Alice mine is being operated by the Silver Creek M. Co.; manager, M. Hackett.

Near Georgetown, the Mendota mill is now ready for continuous operation.

The mineralized seam continues in the Burleigh tunnel.

At Idaho Springs the Gold Cord M. & S. Co. has bonded the Leap Year lode.

CUSTER COUNTY.

G. B. Raymond, manager Toledo mine, near Rosita, has assays of ore showing values in gold, silver and 10% copper.

FREMONT COUNTY.

The U. S. R. & R. Co., Colorado

Springs, will put in eighteen roasting furnaces at its zinc and lead works at Canon City, which is being overhauled and repaired. The improvements will cost \$100,000; the capacity of the plant is being doubled. The smelter will be ready for work October 1.

GILPIN COUNTY.

It is locally stated that the Carpenter smelter at Golden has been turned over to the trust and that the latter will handle the ores from the Saratoga and the Stevens group of mines, now being treated at the Golden plant. F. H. Carpenter says that if the trust is to operate the plant he knows nothing about it. He has received no intimation of any change. The plant is owned in Detroit; he has been in charge. Dr. Carpenter says:

"So far as I know, there is nothing to the report. It is one of those which break out every once in a while. The smelter is absolutely free from the trust in every respect. We are only selling, to them the matte which is our product. The relations existing between our company and the American S. & R. Co. have always been pleasant. The Golden plant was erected primarily to treat the ores of the Saratoga mines, and not for general custom work. It was not our intention to compete with the local mills, which can treat certain ores to better advantage than we can, especially those high in silica. The Golden smelter is not now, nor has it ever been, to my knowledge, for sale. After its erection we found that we could buy and treat certain ores to advantage. This we continue to do. Ores not carrying lead can be shipped any day to the Golden plant. It has never been closed for the receipt of ores a day since it was first opened."

The local paper asserts that the capacity of the smelter is to be doubled at once and the contract given to J. M. Thexton of Idaho Springs.

Manager J. Dickey of the Hidee G. M. Co. intends sinking the shaft 200 feet further. The shaft shows a small streak of gray copper and iron ore. The property has a gasoline plant.

Superintendent M. Lewis at the Mackay-Burroughs property on Quartz hill is making regular shipments.

GUNNISON COUNTY.

At Gunnison, Crymble & Son have men at work on the David H., in the Tomichi district. The vein is 5 feet across and assays thirty-six ounces in silver and 34% lead to the ton.

The Good Hope mine, Vulcan district, during the past few weeks has shipped from the fifth level \$60,000 worth of ore while the mine machinery was undergoing repairs and a full force was not employed in the mine. Some of the ore runs as high as \$1000 in gold to the ton.

Superintendent H. Miller has made a strike in the Hard Cash lode on Galena mountain in the north end of the county.

J. G. Bolmer and N. M. Clemmens of St. Louis, president and secretary of the Copper Queen M. Co., are at the company's property in Copper Queen basin, north of Crested Butte. They contemplate considerable work.

LAKE COUNTY.

(Special Correspondence).—The R. A. M. Co. are shipping forty tons of lead sulphide ores per day to the smelter. They are also shipping some zinc ore to Gas, Kan., and if the experiment proves successful it will undoubtedly lead to a good market for zinc ores.

A. A. Bernard & Co., who have been leasing on the Vanderbilt mine the past four years, have closed down indefinitely. Leadville, Aug. 15.

(Special Correspondence).—Dr. J. H. Heron of Leadville is installing a hoisting plant on the Clover mine, at the foot of Ella hill, and will sink a shaft on the property.

The Two Bit G. & C. M. Co. of Leadville, operating in Two Bit gulch, 11 miles south of Leadville, have sunk a perpendicular shaft 350 feet and drifted 90 feet across to the vein, striking the vein below the lower workings in the incline. They are working twelve men. The ore averages 3 ounces in gold, 200 ounces in silver and from 15% to 40% copper.

Leadville, Aug. 14.

(Special Correspondence).—The Bartlett tunnel, on Mt. Elbert, 15 miles from Leadville, is being operated by the Twin Lakes G. M. Co. The company owns about 200 acres of ground and for the last six years has been driving a tunnel to tap some of the veins and porphyry dikes that are so numerous on the surface of the mountain. Last fall they cut the first vein that showed any satisfactory values, and are now in shape to get good interest on their investment. They have a 10-stamp mill and are preparing to add cyanide tanks. A 2½ H. P. gasoline engine runs a blower to furnish air in the 3300-foot tunnel, which keeps a perfect circulation throughout the workings. They have about 750 feet

of ground above the surface where they are now working, but have started another tunnel which will tap this vein, after being run about 4000 feet, at a depth of 1200 feet. The ore yields about \$30 per ton on the plates and gives 2½ tons of concentrates, worth \$40 per ton, per day. Leadville, Aug. 18.

Leadville reports considerable new work this month. The Valentine property is about to resume. Several of the shafts of the Fryer Hill Mines Co. will develop their ore bodies, which have long lain idle. A lease has been given by the Estella M. Co. to G. S. Schlessinger on the Bon Air and Starr shafts, and machinery will be placed at both these properties. The Louisville mine and the President property are resuming operations. The new mill at the A. Y. and Minnie property has started on the low-grade ore of that mine. Preparations are being made to push development on the Valley combination. Ground has been broken for the new concentration mill at the Resurrection property. The old producers of the district continue and the output of the camp at present is about 22,050 tons of all classes of ore per day.

At Leadville, M. J. Murray, manager Ball Mountain & Big Evans M. Co., will sink the shaft another 100 feet.

MINERAL COUNTY.

Creede has shipped between Jan. 1 and Aug. 9, 1902, 2221 cars, 38,534 tons ore. Operations at the Commodore, the largest producer in the district, have been hampered by the non-arrival of machinery ordered some time ago. The United Mines and all properties operated continue to improve as development progresses.

OURAY COUNTY.

Ouray reports regarding the output from the Camp Bird show that the production of the mine from May 12 to June 15 inclusive was 7753 ounces bullion, yielding \$117,549; concentrates shipped, 534 tons, yielding \$40,055; cyanide product estimated at \$14,000; total, \$171,604.

W. B. Sawyer proposes to start the Saratoga mill at Ironton and erect a pyritic smelter. The working of the smelter will bring about the completion of the railroad between Red Mountain and Ironton.

PARK COUNTY.

(Special Correspondence).—W. H. Smith & Co. of Denver have bought the Winrow Co.'s mines and mill through W. J. H. Miller. The Winrow ore is between quartzite and schist and is a carbonate and oxide of iron, highly siliceous. The ore body is 10 to 40 feet thick and can be worked by a system of tunnels. Alma, Aug. 15.

PITKIN COUNTY.

(Special Correspondence).—The Smugler Zinc mill here is commencing work on an addition to the mill, putting in additional machinery for the treatment of slimes. They are adding one large and five small tanks for settling the water that carries the concentrates. Expect to have same in operation in about six weeks. In their mill they use rolled steel tires in their 6-foot Chilean mill and have handled 30,000 tons of ore with one set of working parts which lasted eighteen months. The tires weighed 1400 pounds each; ring die, 2900 pounds. When the tires were taken off they had holes worn through them, also the ring die.

The Hunter Creek M. Co. are operating twenty concentrators, handling about 100 tons per day.

The Mollie mill is only operating part of their mill at present, having closed down when the A. J. mine closed down several months ago.

Aspen, Aug. 17.

PUEBLO COUNTY.

F. Guiterman, of the Western executive committee of the A. S. & R. Co., says the Philadelphia plant, instead of being dismantled or abandoned, will be improved, and that the facts are: That the enlargement of the plants in Utah, Leadville and at Durango is for a time reducing the quantity of ore that has been treated in Pueblo; the amount received at the present time is light, and advantage is being taken of the situation in closing all but four of the furnaces of the Philadelphia plant, in order to install the new machinery.

Following is the log of the Steel City Oil Co.'s well No. 1, which is being bored near Pueblo:

	Feet.
Shale, mixture lime.....	50
Ten-inch drive pipe, 63.6 feet.	
Limestone, white.....	20
Shale, blue, yellow, white.....	80
Limestone, gray.....	25
Sand, gray.....	30
Shale, dark, blue-black.....	75
Limestone, very white.....	40
Shale, blue.....	60
Limestone blue.....	10
Shale, dark.....	60
Limestone, mixture soapstone.....	20

Shale, mixed with sand.....	130
Sand, Benton fossil bed, water.....	10
7½ casing, 729 feet.	
Shale, blue-black.....	150
Shale, very black, strong oil showing.	15
Dakota sand, artesian belt.....	75
5½ casing, 910 feet.	
Shale, blue.....	10
Shale, red.....	45
Present depth.....	1005

SAN JUAN COUNTY.

Silverton reports that all the mines in the San Juan district are working, the strike order which was to have taken effect on the 15th having been recalled upon a compromise satisfactory to the labor union and the mine owners. Much credit is due both factions for the satisfactory way in which the matter was settled. Some mine owners favored shutting down in case the union was stubborn and refused to grant any concessions. A committee from the miners was advised of this fact and conceded the minor requests of the owners. The mine owners in turn made concessions. The scale as finally approved is as follows:

On and after Sept. 1, 1902, for a term of three years, the undersigned will pay the following scale of wages to their employees:

WORK UNDERGROUND.

Miners.....	\$3 00
Machine men.....	4 00
Machine men helpers.....	3 50
Mule drivers.....	3 00
Nippers.....	3 00
Timbermen.....	3 75
Timbermen helpers (whose employed all the time).....	3 25
Hoisting engineers.....	4 00
Station tenders.....	3 00
Blasters.....	3 50
Trammers and shovelers.....	3 00

All the above for eight hours.

OUTSIDE WORKERS.

Engineers.....	\$4 00
Firemen.....	3 50
Both twelve hours.	
Blacksmiths.....	4 00
Tool sharpeners.....	3 75
Blacksmith helpers.....	3 25
Laborers.....	3 00
All nine hours.	
Mill men, battery, Huntington, Chilean.....	4 00
Crushers.....	3 75
Jig men.....	3 75
Table men.....	3 75
Vanners.....	4 00
Tailings plant.....	3 25
Engineers.....	4 00
Firemen.....	3 50
Mill helpers.....	3 25
All twelve hours.	
Crushers.....	3 25
Mill helpers.....	3 00
Blacksmiths.....	4 00
Blacksmith helpers.....	3 25
Roustabouts.....	3 00
All ten hours.	
Tramway men, grip men and bucket men.....	3 25
Brakemen.....	3 50
Oilers and linemen.....	4 00

All ten hours.
For all classes of labor sinking shafts 25 cents per day shall be added.

For all classes of labor sinking wet shafts another 25 cents per day additional.

Short shift on Saturday for all ten-hour men, short shift to be nine hours.

Nine hours shall be considered night shift for all ten-hour men.

All men to go to and from work on own time.

Rate of wages for all labor not enumerated herein shall be agreed upon between employers and employees, provided that minimum wage scale shall be not less than \$3 per day. All contracts shall be in writing. At the expiration of seven days after beginning work contractors shall have the option to relinquish contract without penalty. Such provision shall be made in the contract. If at the expiration of seven days contractors decide to finish the contract, both parties to the agreement shall use their best endeavors to have the contract completed.

SAN MIGUEL COUNTY.

Men are developing the vanadium deposits in the vicinity of Placerville and Newmire, 18 miles west of Telluride. The company controls forty-five locations, which cover an area of vanadium and uranium. A. B. Frenzel, the discoverer, has been in Europe testing the ore and experimenting with it, and has a contract with firms in Paris and other foreign cities to take the entire output from the properties. A low freight rate has been obtained to transport the product to Galveston. The company has in contemplation a plant for treating the crude product.

The new mill of the Ophir Con. Co., Ophir Loop, will be in operation next week. At the mine two machine drills are opening ground on the Butler and Ida veins. The Ida ore will be put

through the new mill, which is being constructed especially for that purpose, the ore being free milling.

SUMMIT COUNTY.

Mr. Doolittle, superintendent smelter at Robinson, says the new furnace for the smelter is on the way, and will be put in immediately on its arrival.

TELLER COUNTY.

Cripple Creek reports that on the Zenobia two 100 H. P. boilers and a double hoisting plant of machinery, the hoist to be used exclusively for the developments of the levels already started and the other one for sinking the shaft, will enable the company to continue sinking down to 1500 feet depth. Stations have been cut every 100 feet; the levels of the Zenobia are on the level with those of the American Eagle, owned by W. S. Stratton.

O. B. Finn, lessee of the old Brodie mill which was burned on the 10th, expects to save the bulk of the ore that has been precipitated as well as that in the vat. Some 250 tons had already been treated and was waiting to be filtered. An additional 150 tons had been saturated with the primary cyanide solution when the fire occurred. Another 100 tons of crude ore was in the bins.

N. S. Wilson, late superintendent Moon-Ancor Co., has a lease on the entire Gold hill property of that company, and has commenced work on the fourth and fifth levels.

The pay roll of the mines in the Cripple Creek district for the month of July approximately reached \$700,000.

Chas. Walden, manager the Last Dollar mine, on the saddle between Bull and Battle, says that he has reached a depth of 1250 feet and the ore is continuous, and with depth has grown richer.

R. Johnson, the head machinery man of the Colorado Trading & Transfer Co., says: "Never before in the history of the camp has so much machinery been moved as there has been so far this month. In the district there are seven heavy machinery wagons and every one of them has been on the go as hard as possible since the first of the month. Considerable of the machinery is being put up by lessees, and the lessee is the backbone of the camp. They will take chances that the company refuses. The work that is being planned is immense and before long the number of plants in operation will be greatly increased. The machinery men are being worked night and day and the results will soon be apparent by the new strikes and the ore production."

At Cripple Creek the Ida May claim on Raven hill is producing 400 tons of ore a month, average value three ounces. The Strong mine on Battle mountain is making daily shipments of ore amounting to sixty tons, averaging \$30.

An examination is reported being made of the property of the Golden Cycle Co. by the U. S. R. & R. Co. with a view to purchase. This property is now producing 100 tons per day. The ore is susceptible to chlorination.

Relative to the resurvey of Cripple Creek, R. A. F. Penrose says that the Government will undertake it next summer, and will in all probability be carried out under the direction of Mr. Penrose, who made the original survey in 1894.

On the Jewel claim, in Poverty gulch, belonging to W. S. Stratton, a lessee has opened a body of ore that is yielding assays of twenty ounces to the ton.

In the case of the Portland G. M. Co. against the Monument M. Co., where suit was filed in the federal court for \$250,000 damages and an order asked for restraining the defendants from further work, an agreement permits the defendant company to continue work on the disputed claim, but stipulates that 35% of the profits are to be deposited in court pending the final settlement of the suit.

Cripple Creek reports a strike in the Shurtleff property, on Bull hill, adjoining Stratton's Eagles, in the 700-foot level, of a body of smelting grade ore.

A strike has been made on the Blue Bird, Bull hill, in the 1365-foot level, of a 6-inch body of gray copper. Assays return values of 4000 ounces in silver, 100 ounces in gold and 15% copper to the ton.

A. E. Allenbaugh of Cripple Creek has sold to Brooklyn men his one-third interest in the Americus, Chinn and Fairview claims, at Garfield, for \$250,000—\$50,000 cash, \$100,000 in twelve months and \$100,000 in two years.

IDAHO.

BLAINE COUNTY.

A. Wilson of Martin will develop the property of the Mayflower M. Co., 60 miles from Blackfoot and 40 miles from Mackay, the terminus of a branch of the Oregon Short Line Railroad. The treasurer is H. E. Neal of Boise. The company is putting up a 5-stamp mill. It is the intention to have the larger part of its ore treated at the Mackay smelter.

J. Black, manager Hattie Co., Hailey

gold belt, is pushing development work. The Tip Top, owned by J. Q. Packard, has gold and silver bearing ore at a depth of 1000 feet. In the Minnie Moore the shoot has been recovered. The property is now in the hands of Chicago men, by whom it was unwatered. At the Black Cinder the pumps have been withdrawn to join the Camas No. 2 in the sinking of a new joint shaft. The Croesus is to resume. The Idaho Democrat, under the management of S. Allen, continues production. The Five Points group, in Smoky district, has just been sold to Mr. Rogers of New York for \$30,000, and next spring will have a mill.

BOISE COUNTY.

The Lincoln M. Co., Pearl district, will put in a mill of 100 tons daily capacity.

IDAHO COUNTY.

The Jumbo M. & Co. has incorporated at Grangeville; G. Flier, G. W. Fisher of Concord, G. W. Overfield of Grangeville, L. and C. Olson of Dixie, F. Brown of Mount Idaho.

G. M. Waterhouse says at Warren 400 men are employed at the Silver King mine; part in the mine, a number in erecting the mill building and removing the 10-stamp mill from the Iola property to the Silver King.

On Smith profile and Big creeks in the Thunder Mountain district work is being done.

At C. L. Hathaway's placer camp on Grouse creek, between Resort and Warren, are sixty men working.

At Resort, the Golden Rule P. M. Co., C. L. Hathaway, manager, has 2000 acres of mining ground. This season they have been running a duck hose for a pipe at present, with a 2½ inch nozzle on a 6-inch hose. They have four carloads of hydraulic pipe and four giants at Council, the terminal of the railroad, which they will have hauled in by teams, 75 miles, in time for next season's work.

At Dixie, W. H. Plummer has bonded the Dixie group of claims, the Dixie Queen, Evergreen, Pilgrim, Scrap Iron, Marguerite, and a millsite, to Chicago men for \$100,000. The bonders are to put \$1000 per month into the property until 1000 feet of underground work is completed, within a year. There is already machinery and improvements on the claim to the value of about \$40,000, and additional equipment is to be added as needed.

NEZ PERCE COUNTY.

At Lewiston, the Pacific Coast Pipe Co. of Spokane, Wash., has a contract at 49¢ cents a foot for 8000 feet of 8-inch wooden pipe, and at 39¢ cents a foot for 3000 feet of 6-inch wooden pipe. Crane & Co. of Portland have a contract at 44¢ cents a foot for 6-inch c. i. pipe and at 26.97¢ cents a foot for 4-inch pipe.

OWYHEE COUNTY.

The Silver City Avalanche reports a strike of gold ore on the Holland property on Florida mountain.

SHOSHONE COUNTY.

The Gem concentrator, owned by the Hecla M. Co., is now taking 200 tons of ore per day from the Hecla mine. The power for the mill is furnished by water, but steam will be used, which will necessitate more men.

A county road from Burke to the Hercules mine is building. It will be run by the Stanley, Trade Dollar and other prospects. The road has been needed for some time.

The Wallace Tribune gives credence to a local rumor of a contemplated sale to the American S. & R. Co. of the Tiger-Poorman, Standard, Mammoth, Hecla, Helena-Frisco, Morning and Hunter mines. That would leave the Hercules as the only independent producer in Canyon Creek and Mullan districts.

Near Burke the Hercules mine put in a sawmill and a six-drill compressor. Thirty men are employed. The company plans to construct an aerial tramway from the mouth of the mine to the railway tracks at Burke, 1 mile.

On the monthly pay day on the 15th at the Bunker Hill & Sullivan mine the amount paid out was \$55,000, distributed among 550 men, including office help. The most of the men work in the mine at Gardner.

At Gem the Frisco mine will resume operations. The pumps are working day and night to keep the mine free from water, so that work can be started at short notice.

At the Snowstorm mine, 3½ miles east of Mullan, in tunnel No. 2, which taps the vein in about 700 feet and a depth from apex of 600 feet, a body of ore 42 feet wide is cut, which was drifted on 125 feet west and crosscut both ways, showing the ore body to be the same width as where crosscut by tunnel. A drift to the east was run for 110 feet, the face of which is of azurite and silicate of copper. The new tunnel, No. 3, is now in 150 feet, and when

finished will tap the vein at a perpendicular depth of 1072 feet.

MICHIGAN.

HOUGHTON COUNTY.

At Houghton the Baltic mill has started its full complement of three heads of stamps on double shift, stamping 1500 tons of rock daily and making possible a product of 600 tons of copper monthly.

The electric haulage plant in the Butler tunnel of the Adventure is in operation, the second plant of its kind in the copper country. The tunnel crosscuts five lodes and is nearly half a mile long.

MINNESOTA.

More than 12,000,000 tons of iron ore have been shipped from the upper lakes to Eastern and Chicago furnaces so far this year. Of this 7,250,000 have come from Minnesota mines, a greater proportion than in any past year. It is evident that there may be moved during the full season of navigation more than 24,000,000 tons if there is need of so much, and it now looks as though there would be. This will be 12% more than the year before, which was by far the biggest year on record. Last month the Sault canal alone passed ore to the amount of 3,500,000 gross tons.

MISSOURI.

JASPER COUNTY.

Joplin reports no change in the assay basis price of zinc ore, which is still \$35 per ton for ore assaying 60% zinc or better, but under grade ore sold at a rate of \$34 for 60% zinc. The highest price reported paid was \$38 for several bins of 63% zinc. Lead ore sold all week at \$49 per ton delivered.

The output by camps is as follows:

	Zinc.	Lead.	Value.
Joplin	3,386,500	450,880	\$70,311
Galena-Empire	1,371,070	138,410	23,957
Carterville-Webb City	1,737,520	314,570	35,517
Spurgeon	190,100	73,410	4,614
Aurora	718,350	22,010	11,820
Oronogo	394,930	5,260	6,749
Duenweg	1,194,710	150,310	22,396
Prosperity	528,180	22,050	9,783
Neck-Alba	411,550	.....	7,202
Wentworth	87,720	.....	1,053
Central City	240,420	5,200	3,493
Cave Springs	211,080	.....	3,377
Carthage	329,780	.....	5,606
Zincite	208,720	.....	3,653
Carl Junction	100,930	.....	1,817
Granby	402,000	59,000	5,825
Fortuna .....	.....	86,080	2,112
Sherwood	40,260	.....	604
Total value	\$188,403	\$31,486	\$219,889

MONTANA.

The receipts of gold and silver at the Helena Assay Office in July show an increase of \$18,784.92, as compared with the same month of last year. There was a notable decrease in the receipts from other States than Montana, but there was an increase of \$44,349.10 from Montana, which more than offset it. The receipts were as follows:

	1902.	1901.
Montana	\$172,501.95	\$128,252.85
Idaho	14,145.99	15,673.94
British Columbia	17,398.99	52,303.72
Other States	13,713.53	2,145.03

Totals

There was a marked increase in all the gold-producing counties of Montana. Lewis and Clarke, of which Helena is the county seat, shows an increase from \$22,015.06 to \$35,156.35; Fergus from \$32,458.95 to \$45,540.67; Madison from \$24,063.76 to \$36,483.36; Park from \$11,721.85 to \$17,836.11. Last year the undivided county of Deer Lodge together shipped \$15,414.92, while this year Powell and Deer Lodge together shipped \$16,232.26, of which Powell contributed \$12,467.87 and Deer Lodge \$3764.29.

BEAVERHEAD COUNTY.

W. Driscoll of Twin Bridges is developing the Golden Era, Mascot and Baltimore claims, 12 miles northwest of Bannack. He has a tunnel 150 feet and has 5½ feet of ore, carrying gold and copper.

At Bannack the Excelsior mine continues to yield ore.—At the Polaris mine connection has been made between the tunnel and the old workings.

The A. F. Graceter, F. L. Graves and Montana gold dredgers continue working on Grasshopper creek.

Graphite exists in commercial quantities in Axe canyon, south of Dillon, said to be the only place in the United States where crystal graphite is found. The product of these mines is said to equal the best grades brought from Ceylon, and it has been favorably passed upon by the Dixon Crucible Works, to which company several shipments have been made.

At Hecla, formerly known as Lion City, near Glendale, H. Knippenberg has a

large body of silver lead ore. Some of it runs 100 ounces in silver and 40% lead.

Bonanza is a new mining camp 10 miles from Wisdom, near the Big Hole river. A group of claims there has been bonded to W. E. Sanders of Helena for \$60,000. At the Franklin Stant property, Stant is crushing some of his ore in an arrastra. It averages about \$45 per ton gold.

CHOTEAU COUNTY.

J. J. Hill of the Great Northern Railway Co. will erect a steel and iron plant at Great Falls. He has bought a half interest in the Conrad iron mines for \$25,000 and the recently discovered deposits of manganese in Jefferson county for \$17,000.

FERGUS COUNTY.

The Great Northern M. & D. Co., at Gift Edge, has sold its property to J. A. Drake of Chicago, Ill., for \$500,000. Two payments have been made upon the purchase price, final payment to be made in October. The purchaser will enlarge the mill and operate the property upon a larger scale than at present.

GALLATIN COUNTY.

E. F. Slack, of the Montana Corundum Co., says the mill will be in operation next month. The company has twenty-two men employed, some of whom are building a dam at the head of Elk creek. The mill will have a capacity of fifteen tons per day, turning out about four tons of crude mineral. Crushers are to be used in reducing the corundum to powder fine enough to pass through screens from 45 to 100-mesh.

GRANITE COUNTY.

The Michigan & Montana M. Co. will work its property on Stony creek, 16 miles west of Philipsburg, under the direction of J. H. Ortman of Philipsburg.

F. Pilling has a retort of gold from the property of the Sunday M. Co., adjoining the Royal Gold, valued at \$2500—the result of a two weeks' run and the seventh turned out of the mill within three months.

The Good Hope M. Co. contemplates the erection of a steam hoist on the Silver Chief claim at Tower.

JEFFERSON COUNTY.

Work at the property of the Eva May M. Co., near Basin, will soon be resumed.

LEWIS AND CLARKE COUNTY.

The Boston & Seattle M. Co. of Toledo, Ohio, who recently purchased the Ontario, Richmond and other properties in the Little Blackfoot district, has C. R. Tuttle as general manager, who will make his headquarters at Helena.

Near Helena, D Davenport, who holds the Kenwood copper mine under bond, will begin work on the property. Under the terms of the agreement with the owners he must begin work before Oct. 1 to escape forfeiting the bond. The property is bonded for two years from June 30.

MADISON COUNTY.

Howell & Morris are operating the Regenta, near Twin Bridges.

NEVADA.

CHURCHILL COUNTY.

J. E. Spencer, superintendent of the Keora M. Co., will sink the shaft 100 feet deeper. If the ledge holds its present width and value a plant for the reduction of the ores will be erected.

ESMERALDA COUNTY.

Near Hawthorne the surveyors have completed the work of surveying the pipe line from Cottonwood canyon to the Pamlico mine. They have also made surveys for a millsite near Pamlico and a tramway from the Lapanta mine to the millsite. Tunneling for an increased water supply is in progress at Cottonwood.

EUREKA COUNTY.

Ore shipments by rail from the mines of Eureka for the week ending August 15 were as follows: Bullwhacker 46,260 pounds, Cyanide 26,500, Diamond 40,940, Eureka Con. 61,420, Excelsior 48,890, Helen 2780, Madrid 11,530, Macon City 2250, From Hamilton: Rocco-Homestake 61,550, L. Lani & Co. 34,430.

HUMBOLDT COUNTY.

The new hoist at the Adelaide mine, 14 miles south of Golconda, is completed and work will be resumed in the incline shaft. Bodies of copper ore are being developed.

Manager C. S. Vagner of the Gold Note, Kennedy, has ore which shows on controls \$86 gold and eight ounces silver per ton.

LANDER COUNTY.

P. T. Farnsworth, of Salt Lake City, Utah, is said to have decided to put in a mill on the New Pass mine at South Pass.

LINCOLN COUNTY.

A cyanide plant at Searchlight is treating the old tailings.

The mill at Sandy is running full time on ore freighted from the Keystone mine,

7 miles east of Sandy. There are twenty men employed at the mine.

The Nevada Keystone M. Co. has incorporated at Pioche.

Mrs. Rose Howard, who owns claims in Chiquita hills and works them herself, has made application for membership in the Searchlight Miners' Union. This being the first case of the kind on record, the union has referred the matter to the headquarters of the Western Federation of Miners for instructions.

LYON COUNTY.

The Pollard mill in Silver City is crushing ore from the Silver Hill mine.

Silver City reports a mining deal under way whereby the Quinn mine may be sold for \$40,000.

The Como-Eureka Co. at Como will build a new mill. Power will be supplied by an electric plant which the company will install, obtaining water supply from the Carson river.

Development work on an extensive scale will be begun on the Bluestone mine, near Yerington, Sept. 1.

NYE COUNTY.

Superintendent F. J. Siebert of the Tonopah M. Co., the Tonopah T. & M. Co. and the Klondike M. Co. says the Tonopah M. Co. is employing 190 men, 30 are on the Tunnel Co.'s payroll and 30 men are working in the Klondike mine. Nothing but strict development work is being done. The only ores extracted are in the course of this work, yet 600 horses are used transporting ore to the railroad. Nearly all this is new ore extracted from the various workings. A great deal of the ore taken out by the leasers is still on the dump. The ledges in Tonopah continue to widen with depth and preserve their surface values. The proportion of values is 1 ounce of gold to 100 ounces of silver. In a winze 50 feet below the 300-foot level is a ledge 8 feet in width that averages \$350 per ton.

The Tonopah Union M. Co. is organized; J. L. Butler, F. K. Thorn, H. C. Stock, T. Colehan, A. Revert. The property of the company consists of five claims on the west slope of Gold mountain, 5 miles south of Tonopah. Assays show values two-thirds in gold to one-third silver. Two shafts will be started.

Blythe & Hanson, from Long Beach and Los Angeles, Cal., have bought one-half interest in the Gold Hill Extension group, comprising seven claims and a tunnel site. The first payment of \$15,000 is made and deeds placed in escrow pending final payments Oct. 1. The present double-compartment shaft will be extended 300 feet and a 26 H. P. gas engine, hoist, gallows-frame and equipment installed.

Tonopah county is next in order. Development work at Tonopah dates from March 1, 1901, and since that time the camp is said to have produced upwards of \$7,000,000 without the aid of outside capital.

STOREY COUNTY.

Superintendent Kyle of the Silver Hill is shipping \$8000 in bullion monthly. The ore averages \$15 50 to the ton.

An addition of five stamps to Fisher's mill, Six Mile canyon, near Virginia, is planned.

WASHOE COUNTY.

The Hutchinson mine, Olinghouse canyon, has ore which is locally believed to be worth \$20 a pound.

The Con. Nevada M. Co., Wedekind district, is drifting for the ledge from the 155-foot level. The Consolidated Nevada Co. has bought forty acres of patented ground adjoining its claims, making its present holdings eighty acres.

At Steamboat Springs Manager Hopkins will put in an 80 H. P. boiler at the Great Western hoist. Miners go to work next week. A station will be cut at the 100 level.

WHITE PINE COUNTY.

A strike of \$100 ore is reported in the Joana mine, near Ely.

The most recent strike at Ely is in the Ruth, averaging 23 1/2 copper. The Ruth shaft is down 275 feet.

NEW MEXICO.

OTERO COUNTY.

Amended articles of incorporation of the Electric M. & M. Co. of Jarilla have been filed; capital stock increased from \$100,000 to \$200,000.

SANTA FE COUNTY.

Manager R. B. Thomas of the Con. M. & S. Co., Cerrillos, says he has finished expending \$125,000 in making improvements and building additions to its plant at Cerrillos. G. P. Hyde, former assistant superintendent of the El Paso smelter, has been appointed superintendent of the Cerrillos plant.

OREGON.

BAKER COUNTY.

M. N. Thompson, manager Granite Mt. M. Co., near Huntington, has let a con-

tract to extend the tunnel on Granite mountain 300 feet.

The Oregon Gold & Copper Co. is incorporated at Baker City; capital stock, \$1,000,000; A. V. Reeves, J. W. Nelson, A. Mohr.

Manager W. L. Vinson of the Little Emma mine has an assay certificate giving returns of \$125 to the ton on Little Emma ore; ore from the lower tunnel cutting a 2-foot ledge that carries a pay-streak 8 inches wide.

Manager Barbee, Crown Point mine, Cable Cove, is installing a new air compressor.

The Oregon Smelting & Refining Co. will have in its new smelter at Sumpter a 200-ton hot blast copper furnace, with all necessary power plant and equipment. The cost of the machinery will be about \$35,000. F. W. Mueller is in charge.

At the new town of Greenhorn the Phoenix mine is being successfully operated.—At the Snow Creek mine J. J. Faucett is putting in a 20-stamp mill, the plant that was formerly at the Little Giant.—The Black Hawk is being operated and a 5-stamp mill running.—The Evening Star, owned by McDaniel & Lew, has a 3-stamp mill producing \$100 in gold daily.

The Baisley-Elkhorn mine, 14 miles from Baker City, after lying idle a year will resume.

In February, 1901, C. A. Smith agreed with J. T. and J. G. English, owners of the Golconda mine, for the purchase of 980,000 shares of stock in the mine for \$400,000. Smith was to expend \$3500 per month on the property for twelve months, make payments on the purchase price of the stock from time to time, and in the end was to become the owner of the 980,000 shares. The right to acquire the stock was at Smith's option. Smith took possession and operated the mine until October, 1901, expending, as he claims, his own money as well as the money taken from the mine—\$20,000—quit work and opened negotiations with the Englishes to take back the mine, and abandoned, it is alleged, his rights under the contract. There is a controversy between the parties as to the terms of this latter agreement. The Englishes resumed control of the property in November, 1901. In July the Englishes brought suit against Smith in Ohio, under the laws of that State, for damages for failure to carry out the terms of the contract made in February, 1901, alleging that the mine was improperly worked; that he had refused to turn over the mine stock. They also alleged separate damages, the aggregate being \$343,000. The Golconda mine was sold by the Englishes, after they resumed control of it again last November, to Sumpter and Pendleton people for \$250,000 cash. It is now being worked.

GRANT COUNTY.

The Fourth of July group of quartz claims, north of Granite, is bonded for \$8000 by S. Camp, who has also bought the Gold Ridge patented claim adjoining for \$3000 cash.

JOSEPHINE COUNTY.

S. Penrose, secretary Waldo S. & M. Co., is visiting the mines of the company at Waldo, where men are developing the properties and erecting buildings. The company projects the erection of a new smelter at Waldo.

LANE COUNTY.

Cottage Grove reports the Music mill, which has been idle two years, has started up; ten stamps will be kept steadily working. There is demand for miners and teams to haul freight.

SOUTH DAKOTA.

CUSTER COUNTY.

At Custer H. Francis is sinking a shaft for the Black Hills & Duluth Copper Co.—The Leroy M. Co. has resumed operations on French creek, 3 miles west of Custer.—F. Herbert of Oreville has been experimenting in the recovery of cassiterite by crushing in his 2 stamp mill, the gangue passing over the amalgamating plates, but covered by the blankets.

LAWRENCE COUNTY.

At Lead, Superintendent Steele of the Hidden Fortune Co. is driving across the Bingham lode, now 160 feet in ore.

Mullen & Munn are placing the rock foundation of the Hidden Fortune mill on the rocky hillside below Deadwood. The railway spur is completed to the site.

The Clover Leaf Co. is laying the sill floor of a stope 50 feet wide in the ore on the 500-foot level, recently opened, and is making a raise to connect with the 400 level for ventilation. When these are finished the whole sixty stamps of the new mill will be put in motion.

S. Thompson, superintendent the Connors Bros. of Spearfish, is sinking a shaft on the Boston group, Bear Gulch district.

Near Lead, the Hidden Fortune has driven 160 feet across the ore body in the Bingham lode, recently uncovered, with-

out finding the west wall. The ore shows milling values in free gold. The Hidden Fortune mill, near Deadwood, is under construction.—The Columbus Co. is re-timbering and enlarging the Columbus shaft to three compartments.—The Sam mine is developing into a valuable property.—The Ohio & Deadwood Co. has installed a 100 H. P. boiler and a six-drill compressor on its mines near Rochford.

Negotiations between the National Smelting Co. and the Horseshoe M. Co. of Deadwood and Chicago are reported. The National S. Co. has completed a 500-ton smelter at Rapid City, intending to get ore from the mines of the Hills, but has failed to get enough ore. The Horseshoe Co. has recently been reorganized by Chicago and Montreal people, and is operating a 100-ton cyanide plant near Deadwood, and is planning the erection of a 1000-ton cyanide plant. Should the deal go through it might mean the closing down of the Golden Reward smelter in Deadwood.

PENNINGTON COUNTY.

At Keystone, the Tycoon Co. has let a contract to run a 500-foot tunnel on the Ranger group, south of Battle creek, along the strike of the Holy Terror ledge.

TEXAS.

JEFFERSON COUNTY.

A report issued by a company operating at Beaumont says: "There has been nearly \$50,000,000 invested in the different branches of this industry at Spindle Top and Port Arthur in the past year; consisting of the drilling of gushers, drilling rigs and other machinery, about 200 oil tanks, average capacity 37,000 barrels each, scattered from Spindle Top to Port Arthur; five pipe lines from Spindle Top to Port Arthur and Sabine Pass; average length 20 miles each, average cost \$10,000 per mile; one asphalt plant building between Beaumont and Port Arthur; one oil refinery now in operation at Taylor's bayou, about 2 miles west of Port Arthur, cost about \$1,000,000. Another oil refinery much larger, now building close by, also at Taylor's bayou; and yet a larger refinery building on west bank of Neches river, only about 2 miles from Beaumont and Spindle Top. This latter is supposed to be a branch of the Standard Oil Co., and is to cost upwards of \$2,000,000. It is estimated there are fully 2000 tank cars now in use hauling this oil to market, average \$800 to \$1000 each; about 200 tank steamers and barges, besides the vast amount invested in Texas oil lands that can't be well calculated; also storage tanks in many cities and numerous other outlays."

UTAH.

BEAVER COUNTY.

Near Milford the Cactus shaft is 630 feet deep. The ore carries 4% copper and good values in gold and silver; experiments show that it can be reduced to a 17% product, in which form it will be sent to the smelter. It is expected to handle 1000 tons per day, which would mean a daily output of 80,000 pounds of copper.

IRON COUNTY.

Development of the Iron Mountain Copper Co.'s group of mines in this county will be resumed at once, is told the Tribune by Manager Frew. The shaft is to be sunk 200 feet deeper.

JUAB COUNTY.

The Centennial-Eureka M. Co. at Eureka has resumed.

The shaft on the property of the Raymond M. Co., north of Eureka, is at a depth of 1050 feet. Sinking may be continued to 2000 feet.

SALT LAKE COUNTY.

Bingham hears of a plan to consolidate the United States, Utah Consolidated, Bingham Consolidated and Boston Consolidated companies' mines and smelters into one corporation, with one management, and a consequent reduction in operating and general expenses. The story is generally discredited. The Utah Consolidated is reported to be now producing 1,000,000 pounds of copper per month, the Bingham Consolidated 800,000 pounds, and it is expected that by January 1 the United States Co. will be adding 750,000 pounds more to the output. The Boston Consolidated is capable of supplying ore enough to add to this estimate 600,000 pounds.

The Tribune says: The reopening and equipment of the Franklin tunnel at Bingham, through which the Silver Shield Co. will, in future, dispatch its ores to market, has been completed, active blasting through the interval that separates the breast from Shield territory to follow at once. From the mouth, which overlooks Bingham canyon, to the breast of the avenue the distance is no less than 3600 feet. Through this entire distance the necessary re-timbering has been done, electric wires have been strung, and with the transformers in place and the electric

motor on the track driving will be resumed.

SEVIER COUNTY.

C. J. Peterson, manager Trapper's Pride mine, Richfield, says that the company has not yet decided whether to use stamps or rollers for crushing the ore. If the stamps are used, the mill is to be of forty tons capacity; if a roller process be decided on, the plant can handle seventy-five tons per day.

SUMMIT COUNTY.

Superintendent Turner of the J. I. C. group, Park City, on which the Federal Lead Co. of St. Louis have a \$200,000 option, is sinking a new shaft 1500 feet south of that of the Daly West.

Manager Dodge of the Bonanza Con., at Park City, has at 300 feet the contact; in the quartzite are splashes of galena carrying silver and gold. It is the intention to continue the tunnel until the farther wall is reached, after which prospecting the contact in each direction will follow.

At Park City the Silver Bell mine is now producing ore for the valley smelters. The new mill of the D. & M. M. Co. at Park City starts this week.

The Wabash M. Co. has approved the purchase of the Storey group at Park City by N. Treweek for \$60,000. At the same session the board adopted a resolution making it discretionary with the management as to who shall be admitted to the mine.

WASHINGTON COUNTY.

At Silver Reef, Manager T. Ferguson of the Silver Reef M. & R. Co., expects to have the new cyanide plant at work by the close of the year on the 400,000 tons tailings.

VIRGINIA.

AUGUSTA COUNTY.

At the Crimora manganese mine, instead of with shafts and drifts, the ore is now being washed out by hydraulic methods. The deposit occurs in a deep basin in quartzite, has a depth of 250 feet at its deepest point and is said to be 1/2 mile long by 1/4 mile wide. The basin is filled with stiff clay, overlaid by gravel; the ore is found in the clay in irregular detached masses of varying size. The ore averages 50% manganese. The mine was worked for several years by the Carnegie Steel Co. The method employed was by shafts and drifts, the deepest workings being 150 feet. This plan required a great deal of timbering, 150,000 feet per month being used, and a large amount of ore was left behind. In the method now in use the covering of wash and gravel is first removed by loading into cars and hauling away. The clay bank is then washed down by water under a head of 275 feet, using a 2-inch nozzle, and the waste runs off through a short tunnel at the lowest point of the pit. The ore, washed comparatively clean in this way, is wheeled to the mill on the edge of the pit, there dumped into a chute, loaded into skips and carried to the crusher at the top of the building; from the crusher it goes to the washer, and then to the screens, all under 1/2 inch, passing to the jigs, and over that size to a belt-picking table, where the large pieces of waste are removed. Some of the pieces of ore still hold considerable clay in the cracks and joints; these are picked out and passed back to a small crusher, the product from which goes to the jigs. Manager Hannan intends running another tunnel that will tap the deposit at its lowest point, thus enabling him to work out the entire basin. The length of this tunnel will be 4500 feet, the greater part being through clay. The production at present is fifty tons per day.

WASHINGTON.

FERRY COUNTY.

Republic mine owners are told that no ore can be taken at the Grand Forks smelter for thirty days. There being no likelihood of the railroad being able to reach the Lone Pine in that time, that property was closed and the men paid off; operations will be suspended for thirty days at least. The Black Tail and San Poil continued operations until word was received that the ore could not be handled owing to the smelter closing down. The stopes in the Black Tail are full of ore, and the same may be said of the San Poil. The mines will remain closed until the Granby smelter resumes operations. Manager Johnson of the Greenwood smelter expects to resume operations just as soon as he can get the coke. It is uncertain when the Boundary Falls plant will start up. These smelters will take some Republic ore, but not to exceed 100 tons per day.

L. H. Hopkins, superintendent Congress mine, Bridge creek, says that men are working on the Congress, Robbin and Art Dumont claims.

Republic has from the Great Northern Railway a rate of \$5 per ton for shipment

and treatment of Republic ores to Everett.

OKANOGAN COUNTY.

W. T. Mendonhall has bonded the Bl-Metallo mine, near Chesaw.

SNOHOMISH COUNTY.

Near Silverton the Copper-Independent mine is being operated. The compressor plant has started up and men are driving the main tunnel, No. 3. This tunnel is in 1100 feet.

STEVENS COUNTY.

J. D. Farrell of the Pacific Coast Co., who recently bought iron claims near Valley for \$25,000, is developing the property. It is expected he will keep thirty-five men at work.

WHATCOM COUNTY.

At Sumas the Excelsior M. Co. started up the stamp mill on the 20th.

The Vera group of claims will be operated and a stamp mill put in.

WISCONSIN.

DOUGLAS COUNTY.

A copper mining property is being opened south of Superior by Captain Dunn of Houghton, Mich. The two shafts which are sinking show native copper.

WYOMING.

JOHNSON COUNTY.

Buffalo asserts that the Lost Cabin gold mine has been found again on Otter creek, in the Big Horn mountains, 60 miles southwest of that place. There is a rush there.

FOREIGN.

AUSTRALIA.

The gold mines of Australia produced in 1901 a total of 1,879,391 ounces. The East Coolgardie gold fields raised the output from that field alone to over 1,000,000 ounces. The value of the Australian output for last year was \$35,213,511, as against \$29,237,014 in 1900. It produced copper ore estimated at \$75,246. The production of lead has practically ceased. The output of block tin was 734 tons, valued at \$40,000.

BORNEO.

J. D. Gillinan says there is great opportunity for American capital and skilled labor in Borneo and Sumatra, especially in territory controlled by the Holland Dutch. Ever since the outbreak of the Boer war the Dutch have favored Americans at the expense of the English. Gold, diamonds, oil, coal and platinum exist, but have not been developed to any extent, because modern machinery is lacking, and the coolies, who do the bulk of the manual labor, can not stand the climate. The Dutch are poor hands at mining, but are generally waking up to the fact that the purchase of American machinery will prove a profitable investment. In south Borneo, controlled by the Dutch, several American mining engineers are prospecting and have found extensive low-grade propositions in placer and quartz. Some of these are exceptionally rich. The Chinese worked a few of these properties until about eighty years ago, when they were driven out by the Dutch.

BRITISH COLUMBIA.

Mining Recorder McInnes of the Slovan has notice that on a date to be set by the department a tax sale of all Crown-granted mineral claims on which the taxes are unpaid, and the rights of all pre-emptors on lands on which the taxes have not been paid, will be sold at auction. Gold commissioners and mining recorders throughout the Province are instructed that, provided they are satisfied that the construction of a trail is essential to the proper development of a claim, a free miner may be allowed to count the cost of the same towards his annual assessment work, on obtaining permission before hand from the proper official and subject to the inspection of the Government.

Repairing the plant of the Bullion Extraction Co., at Silica, 2 miles west of Rossland, is in preparation for the concentration experiments of the War Eagle and Center Star companies. Several carloads of ore will be shipped each week to the plant, and the experiments, under the direction of G. V. Hopkins, will be continued. The system to be tested is understood not to be the Elmore process, but is said to have given excellent results in the laboratory.

The Nickel Plate mine is employing forty-five men. The owners have bonded the Winnipeg mineral claim for \$30,000. Manager Rodgers will build a plant and stamp mill to treat his high-grade ores on the east addition to Stilkameen City.

In the Contact mines, Burnt Basin section, on the Columbia & Western Railroad, 20 miles from Rossland, H. P. Jackson, managing director of the company, sent to Baker & Co., Newark, N. J., some ore and is told by them that the ore car-

ried platinum at the rate of one-quarter ounce troy per ton. The ore carries \$10 to \$12 in gold and silver.

The first clean-up this season at the Con. Carbon hydraulic mine, at Bullion, has been sent to the assay office at Vancouver. It is about \$50,000—the product of twenty-four days' piling pay gravel.

The shipments from Rossland for the week ending the 16th were: Le Rol, \$200; Le Rol No. 2, 1400; Giant, 120; White Bear, 20; total for week, 5740; for year to date, 196,628 tons.

At the Sullivan group at Marysville, the smelter project is not to be abandoned. The company is going ahead with the work and expects to put on a full force September 1, and to be smelting ore within sixty days thereafter. Manager Elmdorf is in charge.

"The lead situation in British Columbia offers so poor an outlook that we have decided to close the St. Eugene indefinitely," says J. Cronin to the Spokane Spokesman-Review. Mr. Cronin is the manager of the mine at Moyie.

"For months, since shipments were stopped, we have been keeping a force of about thirty men on development, steadily opening the ore body, so as to have it in shape when the price of lead should advance enough to give us a market. There is so little cheer in the outlook, however, that the crew on development will be laid off, probably within the next month, and the mine will be standing idle until conditions change. We have decided that it is useless to keep on putting money into development when it is so uncertain as to the length of time until we shall be able to ship.

"Lead in London now is worth about £11 2s 6d, and on that basis the producer in British Columbia is paid only about \$1.30 a hundred for his product, as against \$3.50, which is the contract price agreed upon by the Cœur d'Alene mine owners with the American Smelting & Refining Co. That difference in price puts a fatal crimp on us. There is a duty of 1½ cent a pound on lead ores, and if we could market our output in the United States and pay the duty we would still get \$2 a hundred for our lead, or more than 50% above the market price now in British Columbia. However, we are barred from entering the American market, even by paying duty, because the American Smelting & Refining Co. will not buy our lead at any price until its surplus is worked off, and the smelters outside of the trust are so busy that they can not take our ores."

CANADA.

During the fiscal year ended June 30, 1902, Canada exported to the United States 30,419,000 pounds of copper matte, valued at \$2,990,000, of which over \$2,000,000 worth was exported from the Boundary country.

MEXICO.

Some months ago the San Fernando C. M. & R. Co. decided to develop some mining properties in Mexico. To avoid the heavy taxation imposed by the Mexican Government on foreign corporations doing business in Mexico, the directors decided to list all their Mexican holdings in the name of E. C. Humphrey, the Mexican agent of the company. Recently a stockholder of the company sent to the secretary of the board a clipping from a Mexican paper, telling of the sale of all the mining property owned by E. C. Humphrey to some New York mining brokers. Investigation was made with the result that suit was filed in the U. S. Circuit Court at Los Angeles, Cal., to recover the property. Judge Wellborn decided that the company could not recover, because the allegations of the complaint were based on an acknowledged attempt to evade the law, and therefore had no standing in the court.

CHIHUAHUA.

Manager S. Lawrence, at Barranca del Cohre, where the Lewis Co. is operating, says they are now hauling concentrates a distance of 120 miles to the railroad, but when the new road is in operation as far as Rochivos, near Becoya, it will be necessary to haul concentrates and provisions only 35 miles. Mr. Lawrence will use between 1200 and 1500 mules this fall. There are 250 men employed at the mines.

A. B. Callender, agent Compania Metallurgica de Torreón, has bought a half interest in the Maria claim, Parral, owned by A. L. Rossen.

A 100-ton amalgamating plant will be built at the Adela mine, near Santa Barbara, the property of W. V. Petit. The mine is shipping ores, which carry gold and silver.

OAXACA.

Rich placer grounds 40 miles northeast of Tutepec are reported. There are 100 miners washing for gold along the tributary of the Rio Verde, making from \$3 to \$15 a day. The pay dirt lies about 5 feet below the surface. Sluices are being built

and several washers have been shipped into the country. Several companies composed of Chicago, Ill., men have been organized to work these placers. The grounds are in an accessible part of the country, and no difficulty is experienced in shipping in supplies. The miners already at work include Mexicans, Chinese, Indians and Americans.

SONORA.

The Greene Consolidated at Cananea has three converters at work. The company is shipping at the rate of 3,000,000 pounds of blister copper per month, equivalent to about 6,000,000 pounds of matte, as the Cananea matte does not go more than 50% copper.

W. E. Pomeroy is superintendent Yaqui Copper Co., operating on the Yaqui river, near Sualqui de Bactuco. W. P. Harlow of Tucson is manager. Superintendent Pomeroy states that when he went to take charge forty-five men were employed. The number has since been increased to 140. The only means of getting machinery to the mine is on the backs of burros, and it is necessary to have it built in parts; the copper holdings are located on the line of the proposed railroad from Cananea to Topolobampo.

SPAIN.

In a letter to E. A. Haggren of Rossland, B. C., W. A. Carlyle, writing from Rio Tinto, says: "Our profits last year were \$7,500,000."

VENEZUELA.

P. Schuch, a Colorado miner, has returned from Venezuela, where he has been inspecting the machinery and property of an extensive mining company, and reports that the present civil war is the cause of a total wreck of the plant; that the iron and steel were taken by the insurgents and that a new plant must be installed.

THE KLONDIKE.

It is figured that the output this year will be less than that of last year. According to conservative estimates, it will be about \$14,000,000. Taking the output of last year at \$18,000,000, which was the correct figure, the output this year will be at least \$4,000,000 less. This is the result of a scarcity of water. There are two questions which are to be solved by the Government in connection with the Klondike, and the water problem is one of them. Water must be provided for the creeks so that the miners may treat dirt which now is not considered paying, because it is not so rich as that worked in the past. With good water supply much ground that would not pay to touch at present may be worked to advantage.

Official figures show that the gold shipments from Dawson during May, June and July amounted to less than \$6,000,000. This is less than the shipments during the corresponding periods of several previous years. The figures do not mean that the gold production has lessened to any great extent, but rather that the gold is staying in the country to a larger degree. Controller Lithgow of Yukon Territory has posted notices to the effect that the Dominion assay office at Vancouver will give full assay value for gold free of charge on the production of royalty expert certificates.

Personal.

ARTHUR KNAEBEL of Bland, N. M., is visiting Denver.

F. BETTLES has returned to Salt Lake from South Dakota.

S. W. MUDD has returned to Leadville, Colo., from California.

W. M. NESBIT is manager Helene Co.'s property, Eureka, Utah.

C. S. VADNER is manager Gold Note property, Kennedy, Nev.

W. G. MOORE has returned from Mercur, Utah, to Denver, Colo.

J. W. BUCHER is assayer and chemist N. Y. & N. C. Co., Ely, Nev.

H. ZERBE is general superintendent Cygnat Co., Stockton, Utah.

LEON M. HALL has returned from Grass Valley, Cal., to San Francisco.

CHARLES BUTTERS is expected at Virginia City, Nev., from Europe, Sept. 1.

H. V. CROLL of the Allis-Chalmers Co. has returned to Salt Lake City from Chicago.

WM. LAWLOR is general manager Hidden Treasure G. M. Co., Deadwood, South Dakota.

F. RICHARDSON is manager Santa Rosa mill of the Bufo M. & S. Co., Sonora, Mexico.

DANA KEITH of the Silver King, Utah, is examining mining property in eastern Oregon.

H. A. GALLWAY, superintendent of the

Parrott M. Co. of Butte, Mont., is in Reno, Nev.

N. W. EMMENS of Pittsburg, Pa., is inspecting mining property in Amador county, Cal.

J. M. BALDWIN has returned from Gold Fields, west coast Africa, to Hill City, South Dakota.

G. MCAULAY succeeds S. D. Nesmith as superintendent Big Channel M. Co., Forest Hill, Cal.

M. B. KERR has resigned the superintendency Grass Valley Exploration Co., Grass Valley, Cal.

JOS. DIEDRICHS AND C. A. KUEHN are at Omega, Cal., to plan a mill for the Red Cross M. Co.

D. WOODRUM has been appointed assistant assayer at the Mars, Bully Hill mines, Shasta county, Cal.

PETER DALY, superintendent Tacoma, Wash., smelter, has returned there from Salt Lake City, Utah.

FRANKLIN LEONARD, president and superintendent of the Comstock Tunnel Co., is in San Francisco.

W. A. HEWITT of the Compressed Air Machinery Co., San Francisco, has returned from Sonora, Mexico.

A. A. WHEELER of Nevada county, Cal., has gone to Nelson, B. C., to take a position with the Imperial G. M. Co.

R. M. LING has resigned as general manager McCabe Extension Co., McCabe, Ariz., and is succeeded by J. Bradford.

F. H. PROBERT has returned to Los Angeles, Cal., from an examination of mining property near Phoenix, Arizona.

LOCHIEL M. KING of the Pacific Coast Ore Sampling Works, who has been in Everett, Wash., on business the past month, has returned to Oakland, Cal.

EDWIN E CHASE, E. M., has gone to Mexico on professional business. His address until Sept. 1 will be care El Refugio M. & M. Co., Ocampo, Chihuahua, Mexico.

C. BEDELL, late superintendent Quincy mills, Houghton, Mich., and for thirty years an employe of that company, has been appointed superintendent of the Phoenix mill.

W. A. FARISH of Denver has accepted the management of the Majestic Co., Milford, Utah. He will reach Utah about Oct. 1 and will superintend the development and operation of the company's mines and smelter.

Catalogues Received.

THE Sullivan straight line air compressors and the Sullivan drill form the subjects finely treated in text and portrayal of the Sullivan Machinery Co.'s latest catalogue, issued from their headquarters, 135 Adams St., Chicago, Ill.; 54 pages of matter interesting to anyone at present related to, or likely to be related to, such appliances in any way.

In the special price list, 62 A, the Jeffrey Manufacturing Co., Columbus, Ohio, take up the subject of water elevators of different styles and sizes, some designed for lifting water from wells, others for irrigating and drainage purposes. The Jeffrey horse powers are also described and illustrated, as also their current driven floating water elevator and elevator conveyor. As with all other publications of the kind noted herein a copy will be sent to any address on request.

Standard size, 6x9-inch, Catalogue No. 4, "Gold and Silver Milling," issued by the Allis-Chalmers Co., Chicago, 276 pages, is a compendium of data under that head. The best thing in the way of description in the present work is the 24-page discussion of the Frue vanner. There are some pointers on sectional machinery for muleback transportation, and how to put a sectional motor together, and a good exposition of amalgamation methods. The simple mention of the fact that there are eighty-nine distinct appliances described, and ninety-seven engravings used in such description, illustrates the collective scope of the book, which deserves a far better title than the ordinary one of "catalogue." The work is superb typographically.

Bulletin No. 1015 of the Denver Engineering Works Co., Denver, Colo., 8x10½ inches, 32 pages, is entirely devoted to electric hoists, and goes into the subject with unusual detail. In this treatise Shepard & Searing have avoided the mistake sometimes made by compilers of electrical machinery catalogues who suppose everybody knows all about those things and who thus omit important points. In the booklet received this week the Denver Engineering Works Co. give a good deal of just that kind of information that often appears in "Concentrates" on the third page of this paper in answer to just such questions. Besides this is given a general drawing of each hoist il-

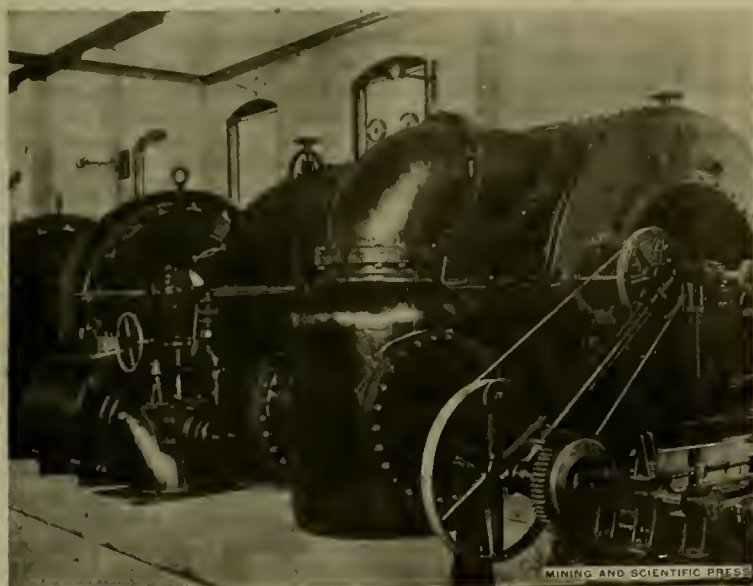
Cyanide and Stamp Mill Superintendent open for engagement. Graduate A thorough assayer and chemist; also accountant. Speaks Spanish. Will go anywhere. Specialty, construction; also successful treatment of low-grade and slimy ores. References "AL." Address PRACTICAL, care of MINING AND SCIENTIFIC PRESS.

MINING AND SCIENTIFIC PRESS

Whole No. 2197.—VOLUME LXXXV.
Number 9.

SAN FRANCISCO, CAL., SATURDAY, AUGUST 30, 1902.

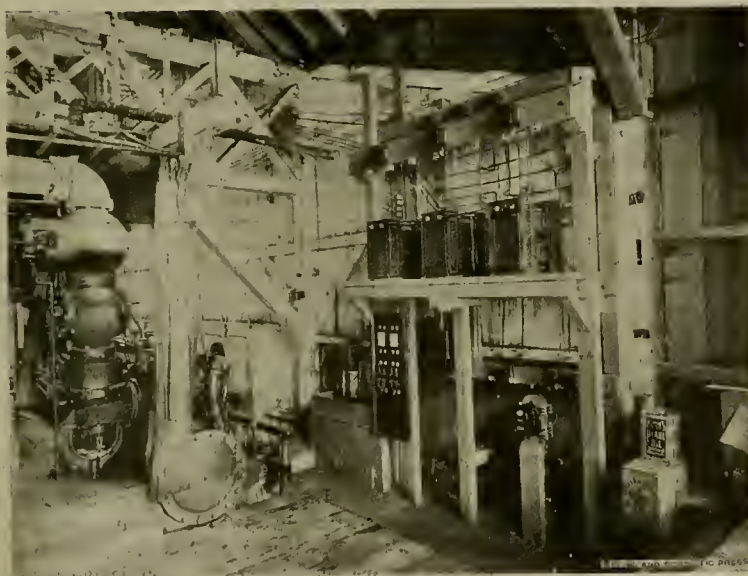
THREE DOLLARS PER ANNUM.
Single Copies, Ten Cents.



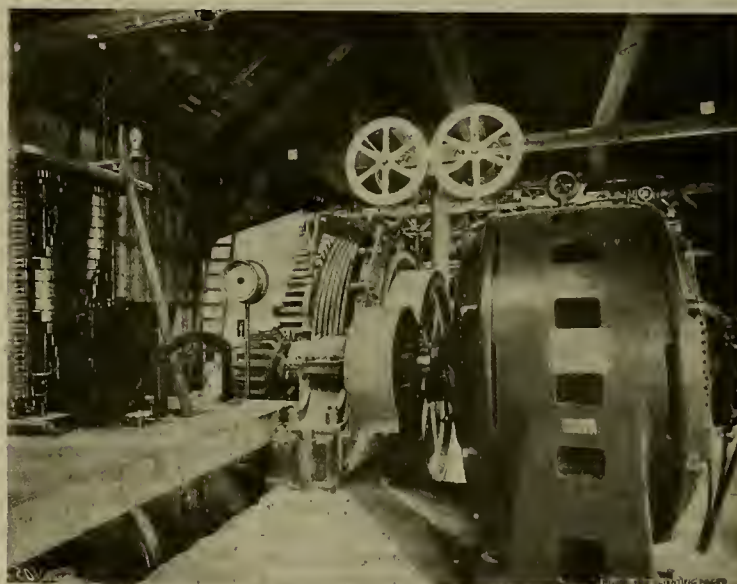
Wheels and Generators at Power Station on Truckee River, Farad, Near Floriston, Cal.



100 H. P. Motor Driving 16½x30-inch Air Compressor at C. & C. Shaft, Virginia, Nevada.



Power and Lighting Transformers on Surface at C. & C. Shaft, Virginia, Nevada.



Electric Hoist, Showing 200 H. P. Motor and Controller, C. & C. Shaft, Virginia, Nevada.



1750 Station, C. & C. Shaft, Virginia, Nevada, Showing Pressure Column for Hydraulic Elevators.



Six-Foot Fan Driven by 10 H. P. Motor on the 2150-Foot Level of C. & C. Shaft, Virginia, Nevada.

ELECTRICAL EQUIPMENT C. & C. SHAFT, VIRGINIA CITY, NEVADA.—(See page 115.)

MINING AND SCIENTIFIC PRESS.

ESTABLISHED 1860.

Published Every Saturday at 330 Market St., San Francisco, Cal.
TELEPHONE, DAVIS 771.

ANNUAL SUBSCRIPTION:

United States, Mexico and Canada.....\$3 00
All Other Countries in the Postal Union.....5 00

Entered at the San Francisco Postoffice as second-class mail matter.

Chicago Office (Telephone, Harrison 73).....737 Monadnock Block.
Denver Office (Telephone, Olive 733).....606 Mack Block.

J. F. HALLORAN.....Publisher.

San Francisco, August 30, 1902.

TABLE OF CONTENTS.

ILLUSTRATIONS.—Wheels and Generators at Power Station on Truckee River, Farad, Near Floriston, Cal.; Power and Lighting Transformers on Surface at C. & C. Shaft, Virginia, Nev.; 1750 Station, C. & C. Shaft, Virginia, Nev., Showing Pressure Column for Hydraulic Elevators; 100 H. P. Motor Driving 16½x30-Inch Air Compressor at C. & C. Shaft; Electric Hoist, Showing 200 H. P. Motor and Controller, C. & C. Shaft; Six-Foot Fan Driven by 10 H. P. Motor on the 2150 Foot Level of C. & C. Shaft, Ill. Electric Pumping Station at 2150-Foot Level, 115. The Shattuck Patent Solar Attachment, 116. Internally Fired Boiler; Red Cross Antiseptic Telephone Mouthpiece, 117. Mining and Metallurgical Patents, 118.

EDITORIAL.—Lack of Structural Iron; Progress of Electricity in Mining Operations; Mining Congress at Butte; Tendency to Overdo in Newspaper Business; Working Miners Producing Lead, Silver and Copper; Excessive Taxation in British Columbia; Lead and Smelting Combines; "Gold Production from Low Grade Ores;" Mining Operations Published in Local Papers; Aluminum; Phenomena Associated with Liquids or Gases; The Business of Mining Engineering, 112.

MINING SUMMARY.—119-120-121-122-123.

LATEST MARKET REPORTS.—15.

MISCELLANEOUS.—Concentrates, 113. Treatment of Gold Ore; A New Nevada Mining District; Mint Figures on Mine Yield, 114. Electrical Equipment C. & C. Shaft, Virginia City, Nevada, 115. Experiments on "Fireproof" Woods; The Shattuck Patent Solar Attachment, 116. Internally Fired Boiler; Restricting Inventions by Standardization; Red Cross Antiseptic Telephone Mouthpiece, 117. Oxidizing Agents in Cyanide Mill Solutions; Mining and Metallurgical Patents, 118. Personal; Commercial Paragraphs; New Patents; Notices of Recent Patents; Catalogues Received; Production of Lead; Clifton, Ariz., Mining District, 123.

It is incongruous that on the Pacific Coast great building enterprises are deferred and delayed because of inability to get structural iron from the east, while immense deposits of rich iron ore lie undeveloped and cheap fuel in the shape of oil abounds.

THE progress of electricity in mining and metallurgical operations has been frequently referred to. The general advance in all manner of electrical appliance to business affairs is constantly noticeable. The one item of railway building furnishes illustration. This month there is completed in the United States since September, 1889, 25,000 miles of electrically operated railways, enough to girdle the globe.

INDORSEMENT of an increased appropriation for the admirable work of the U. S. Geological Survey; a concert of unanimous action toward influencing favorable legislation for a Cabinet of Mines and Mining; and a recommendation of Senator Kearns' bill repealing the extralateral feature of the present federal mining law are among the things that next week's mining congress at Butte might do. It might not do much good to endorse those three things, but it certainly could do no harm.

THE resuscitation of old papers and the starting of new ones is of present notice throughout the metal mining region of the continent, showing the growth and vigor of the mining industry. There is always a tendency to overdo in the newspaper business, but the constant additions to the size and number of publications in the principal mining centers is a fine showing for the basic industry that upholds them and makes their existence possible.

WHEN the working miners, producing copper, lead and silver, get their business into the shape that tends to dispense with the combines that now handle their product, they will manufacture the lead into pipe, shot, etc., the silver into spoons and dishes, and the copper into the multifarious forms of commercial use, right where these metals are mined and refined. This sounds a little strange in 1902, but it will not be long, as times go, till the idea is a present reality. In the way indicated lies the largest possibility of profit and the most likely way of escaping the intolerable toll and thralldom that present conditions are fast imposing.

WITH exceeding great cause, British Columbia miners complain of excessive taxation and oppressive

legislation. They show conclusively and in detail that present conditions are in effect that there is an annual tax in that Province of 20% on the gross production of all that goes to make up the mining industry there, and that thus that industry in British Columbia is being taxed to death. It is a marvel that such stupid legislation was ever begun and a still greater wonder that it is allowed to continue. The killer of the goose that laid the golden eggs was a sane and sensible individual in comparison with the legislators who lay such a crushing burden on that Province.

THE lead combine mentioned in previous issues is about an accomplished fact; already there is some talk of legal action as started some time ago in Colorado against the smelting combine. Suits on the part of the commonwealth are only indicative of public feeling, but are not operative nor likely to be. The only practicable business solution of the smelter trust problem, from the standpoint of the producing miner, is independent competition: in the case of the later combination of lead manufacturers, a combination of lead producers. "It is cheaper to combine than to combat," is the cry of those who have formed the late lead combine, and applies equally as well to those who supply what political economists love to call "the raw material."

THE Jernegan-Marshall-Emmens-Brice-Wynn extraction of sunlight from cucumbers and gold from seawater, bricks, silver and sulphur has not exhausted the limits of ingenuity in that direction, the latest being Mr. Neubarth of Leadville, Colo., who casually "produces from low-grade ore, carrying merely a trace of the precious metals, five or six ounces of gold." Mr. Neubarth is proprietor of "a large grocery store," and has a chemical solution in which he places the pulverized ore, producing "oil of gold," from which he subsequently extracts the gold. It appears, according to Grocer Neubarth, that the gold he thus produces is "in an immature state," and knowledge of its unripe condition is not vouchsafed to the ordinary common assayer or metallurgist. If faith consists in believing what you know isn't so, there should be little difficulty in securing converts to this new metallurgical creed, though the experience of the devotees of this latest alchemist is likely to be more interesting than prosperous.

RARELY does this publication proffer advice to brother publishers, but the suggestion is courteously made that in papers published in a mining region might appear mining news. It does not look well to have a column commenting on the lack of appreciation of capital as regards that particular district, and not three lines of news as to what any mine in that place is doing. The natural conclusion would be that if there was any mining going on something would be said about it. Nothing attracts more favorable attention to a mining town or district than reference to such local operations in the local paper. Of course this is written in the assumption that the local paper really wants to attract the attention of "capital," and have something doing. Most newspaper men do, and it is believed that one good way is to devote some space to brief, accurate statement of principal mining operations and news. It pays every way.

ALUMINUM is the third most abundant element found in the earth's crust, of which it constitutes about 8%, yet few minerals can be considered ores of that metal. Cryolite, a fluoride of sodium and aluminum, contains 13% aluminum and 32% sodium, and was used as an ore of sodium, with aluminum as a by-product. On the west coast of Greenland is the only place where cryolite occurs in quantity. At present bauxite is the most commercially profitable of the aluminum ores, large deposits being mined in Arkansas, Alabama and Georgia. The uses of aluminum are constantly increasing, one of the most notable being in the reduction of other metals to the metallic form. In this process the metallic oxides are mixed in a refractory crucible with finely powdered aluminum and barium peroxide, the latter containing an excess of oxygen and being added on top of the mixed oxides and aluminum. A lighted match readily ignites it, and the heat and excess of oxygen as readily ignite the powdered aluminum which at

once oxidizes, this reaction continuing throughout the entire contents of the crucible, the aluminum taking up the oxygen from the metallic oxides and reducing them to the pure metallic state, the mass becoming molten by the reaction. Metals that were formerly considered almost impossible to reduce to the metallic state are in this way so produced with little trouble and expense, forming valuable addition to metallurgy, and furnishing sundry valuable alloys in preparation of iron and steel.

MANY of the phenomena commonly associated with liquids or gases are also manifested by solids under required conditions of pressure and temperature; if sufficient time be allowed, for nature takes no note of time—there being no past nor future, but one eternal now. The solid state is not entirely a condition of inactivity, but one in which change is slow. Recent chemical experiments show that something like the liquid state occur in metals long before they melt. Take, for instance, two cylinders of copper, placed base to base and held together by gentle pressure, the surfaces in contact having been carefully polished and cleaned. If they are heated to about 400° F. for twelve hours—the melting point of copper being 1100°—the union will be found so complete that if the mass be broken the fracture does not pass through the original junction. The effect of pressure is similar. Powdered metals under a pressure of 10,000 atmospheres produce a mass which has every appearance of having been fused. The slight rise of temperature produced by the pressure will not explain this fact. When cylinders of different metals are placed with polished surfaces in contact, and heated gently, they adhere firmly and alloys are formed at the point of junction. Thus with copper and zinc a layer of brass three-fifths of an inch thick is produced at the plane of contact. That copper and zinc vaporize below their melting points is shown by making a depression in a zinc cylinder and covering it with a copper one. When the pair is heated gently for a time, a distinct layer of brass forms on the copper and a brown stain containing copper on the zinc. This is not due to diffusion from the surfaces which are in contact, for when a ring of mica is placed between the two metals the result is the same.

JNO. SMEEON in 1752 was the first man to ever style himself a civil engineer, and in the 150 years the business has ever been growing more and more of an exact profession, till now it is of equal importance with any of the learned professions, and demands as high a quality of intellect. The business of mining engineering has not as yet reached so high a standard, but is destined to surpass it. The old rule of thumb is being rapidly discarded, and the advance is noticeably greater in the last 20 years than in the preceding 130. Like the miner, who has had to grope his way painfully upward, the mining engineer has had to be creative in his functions, and cause a demand before furnishing the correlative supply. The scope of the mining engineer is becoming a tremendous one in variety and requirements. He is becoming the master and interpreter of protean forces, and in his functions combines the powers of many branches of practical science. Indeed, all the modern arts and sciences, so far as they apply to mechanics, come under the domain of the mining engineer, for nearly everything to make up modern mechanical progress comes in somewhere as a part of the great mining and metallurgical industry, whether it be the whole railroad system of ore transportation, the pneumatic method in converters, the best efforts of the electrician, the most complex and far-reaching process of the chemist, the keenest effort of the geologist, the profoundest demonstrations of the mathematician. Thus the educational equipment of the mining engineer is becoming necessarily as much more complex than it was as are the appliances at his command in contrast with the simple devices of a generation ago. And if the demands for capacity and knowledge seem great, it is to be borne in mind that the rewards are proportional and commensurate. No youthful profession on earth pays higher salaries to-day than are paid mining engineers, and the world of great mining enterprises stands ready to pay a man the value he himself sets upon his services, provided he can demonstrate his worth as a matter of economy—economy in this regard meaning the judicious expenditure of money.

Concentrates.

WHEN a side line divides an apex longitudinally, the whole of the apex belongs to the senior locator.

THROUGH a $\frac{1}{2}$ -inch nozzle, under fifty-two pounds pressure per square inch, there would be discharged 13.43 gallons water per minute.

GOLD 750 fine is worth \$15.50 per ounce; 800 fine, \$16.53 per ounce; 850, \$17.57; 875, \$18.08; 900, \$18.60; 920, \$19.01; 930, \$19.22; 940, \$19.43; 950, \$19.63.

THE use of iron in assaying sulphide ores is because of its affinity for sulphur. The sulphide of iron thus formed is fluxed off in the process of the assay.

THE law requires that the surface ground used for residence and business purposes upon a patented mining claim must be assessed at a price approximating its value for such use and purpose.

"LINDLEY ON MINES" was issued by C. H. Lindley of San Francisco, Cal., in October, 1897. It is now out of print, all the published copies having been sold; a second edition will be issued next year.

THE use of vaporized quicksilver to amalgamate gold is not new; it is an old and unsatisfactory expedient, abandoned wherever tried, because commercially unprofitable and hurtful to the health of the men.

TO reduce a 1% cyanide solution to three-fourths of 1% use three ounces solution to one ounce water; to one-half of 1%, two ounces solution to two ounces water; one-fourth, one to three; one-eighth, one to seven.

ARC LAMPS located respectively 200 feet, 300 feet and 400 feet apart will illuminate plane areas about 31,500, 70,000 and 125,000 square feet in extent. A 20-foot road crossing this area would receive respectively 12.7%, 8.6% and 6.4% of the light delivered to the ground.

A "STELLA" is a \$4 gold piece, of which about 500 were coined at the Philadelphia mint twenty-five years ago. They each contain 6 grams gold 1000 fine, three parts silver, seven parts copper. They are worth considerable as curiosities; \$100 has been refused for one.

THE services of a watchman can not be reckoned in the required \$100 worth of work or improvements on an unpatented mining claim. Assessment work is ordinarily estimated by the day's work at the ruling rate of miners' wages in that locality. Trail or road work does not count, nor is any allowance made for time going or coming.

DURING the twenty-one years of unrestricted hydraulic mining in California, it has been figured that about 21% of the debris in the navigable waters of the State was due to the work of the hydraulic miner, the assumption being that the other 79% was due to natural erosion resultant upon agricultural progress and general occupation of the country.

SODIUM DIOXIDE used in connection with cyanide will tend to occasion a greater extraction in a short time—twenty-four to forty-eight hours. With longer periods its use does not appear to facilitate extraction. The effect of the dioxide is to furnish nascent oxygen, which acts on the cyanide to liberate cyanogen, temporarily hastening the reaction.

AS a matter of law, a bank cannot act as the treasurer of a corporation, because that involves personal liability. Corporations in naming banks as the custodians of funds should designate them as depositories and not treasurers. The functions of the two agencies are dissimilar. Those of a treasurer are personal and usually he has no discretion in the handling of funds. The functions of a bank are commercial, solely.

THE Selby Smelting & Lead Co., the Pacific Coast Smelting & Refining Co., the Mountain Copper Co., the United Verde, the Old Dominion are among California and Arizona smelters that use oil fuel in smelting ores. A Los Angeles company is successfully smelting iron with oil for fuel, as related in last week's issue. The Colorado Fuel & Iron Co., and other Colorado concerns, are also using oil as fuel with success.

A COMMUTATOR is a device for causing the electric current in the wire outside of the armature to flow continuously in the same direction, for within the armature the direction of the pressure reverses every time the field polarity changes. It consists generally of a number of tapered strips of hard drawn copper, cast copper, or cast brass, set into insulation on the periphery of a core so that they present a cylindrical surface and are all separated from each other and from the core of the mica insulation.

"CONCENTRATES" could have the work largely lightened by more frequent use of the index and more careful reading of the paper. It is not uncommon to receive a question from California or Colorado or Montana almost precisely similar to one that had been answered not over a month previously. By looking over the indices of recent volumes and keeping a keen eye on current columns of the more recent issues, querists can often find paragraphs at least approximately answering the inquiry they have in mind.

"STANDARD COPPER" is composed of any kind of stuff that may carry 96% fine copper, and much of the visible supply consists of material carrying obnoxious impurities. Should some high-grade bars be found in stock a premium is paid for them. As high as 30 shillings premium has been paid for Chile bars recently.

Standard copper is the speculative article, and under an ordinary contract the seller can deliver any quality of bars, provided they contain 96% pure, hence the premiums paid for choice brands.

LEAD SHEATHING, which is so universally adopted as a mechanical protection for electric cables and wires, is responsible for several faults. In fiber insulated cables the imperviousness of the lead sheathing is the only guarantee of quality, in that a pinhole, extending through the thickness of the sheathing, will ultimately develop into a fault by the entry of moisture at that point. Such pinholes and flaws are frequently caused by the presence of minute quantities of red lead in the bulk of the metal, which passes through the press and ultimately presents the appearance of a small crack or flaw in the surface of the lead.

THE development of the use of electricity during the past few years has created a demand for mica as an insulating material. Much of the small-sized mica, formerly of little value, if not altogether unsalable, now finds a market among electrical manufacturers. Part of this small mica is reported in the sheet mica products, and as it sells for much less than the larger sizes, which are used in the manufacture of heating stoves, lamp chimneys, etc., it has the effect of making an apparent decline in values. On the other hand, part of the small-sized sheet mica used for electrical purposes is reported as scraps, and in this case causes an augmented value.

TO PREPARE a piece of steel so as to file or turn it into any desired shape, it is necessary to soften it before it can be practically worked. To do this, heat to a red heat and bury in a box of sand which has been previously heated nearly red hot. Allow the steel to remain in the sand until cold enough to handle, and it will be very soft. Never follow the practice of some smiths who bury the hot steel in the fire at night, leaving it to cool off after the fire goes out. Such practice is bad. The carbon in the steel is charged by remaining in contact with the hot carbon of the fire, and the metal may not be as good steel in the morning as it was the night before.

FOR making sharp bends in small pipes or bends of any considerable degree of curvature in large pipes the portion to be bent should be heated, avoiding overheating. The best results will be obtained if the heat is not carried above a dull cherry red. It will be necessary to bend and heat several times in making short bends. After heating the portion to be bent the pipe should be placed in a vise as close as possible to the location of the bend, but without grasping the red hot part. The outside of the curve should be cooled with water. The inside will compress with very little tendency to flattening if not bent too far at a single setting. Any slight flattening may be brought back to circular form by squeezing in the vise before it has gone too far.

WHERE the stockholders of a mining corporation, being ignorant of the selling value of their stock, authorize the president of the company to find a purchaser and effect a sale of their shares at par, and such president, at and before such time, was in secret correspondence and negotiation for the sale of the stock, with a view to a large profit by himself, and by affirmative acts and misrepresentations concealed his transactions from the stockholders, and effected a sale of their stock for a sum largely in excess of par, he cannot retain such excess, but must account to the stockholders for the profits made, notwithstanding he had stated to them that he would retain for his services as agent any sum realized above that for which he was authorized to sell.

CALIFORNIA now refines about 250,000 barrels oil monthly. Ordinary distillation products are: Asphaltum, from 10% to 25%; naphthas, such as gasoline, benzine, 10% to 20%; distillates, gas and fuel, 20% to 50%; illuminating and lubricating oils, 20% to 50%. The asphaltum, as a semi-liquid product called maltha, is used as a flux or solvent for the harder natural asphalts in paving; the harder asphalts, besides being so used, also serving for coating steel and iron pipe, in street and interior electric conduits, paints, varnishes, roof covering, etc. The naphthas, gasoline, benzine, etc., are in general use in isolated gas plants and in stoves in homes and factories. The distillates are used by gas companies for direct manufacture or enrichment of gas for use in gas engines or motors, and occasionally in house stoves and furnaces. The illuminating and lubricating oils are in universal use.

In grinding a slide valve which has been in use until hollow places have worn in the surface, emery mixed with water, or sand and water; will be found better than oil, unless a light body oil, such as kerosene, is used. If water is used with the grinding material, soap should be rubbed on hollow places, and the grinding stuff should be applied to the high parts in small quantities, keeping the low parts clean and dry until an even surface is obtained all over; then the worn out stuff should be used for finishing up. In polishing metal, oil that will gum up should not be used with the polishing material, unless for a dead fine polish. In polishing old brass work which has been scratched and tarnished by wear, pumice stone or bath brick should be used with soap and water for scouring off with, and rotten stone with kerosene oil for the wet finish, and dry for the final polish. The same method should be used for new brass work.

DISCUSSION of ore formation is always interesting if not always conclusive. Mining experts and geologists are giving considerable attention to the genesis of ore

deposits. Three important propositions seem to be agreed upon by most of those investigators: that ore bodies are, with few exceptions, essentially surface deposits, that is, confined to a limited zone near the surface of the earth's surface; that the deposits are of late geological formation, probably few dating back before the Tertiary period; that ore bodies are concentrated chiefly by means of circulating waters which have come from below, from above and from the sides. It may seem to be somewhat against the second conclusion that there are veins found in the granite, but the ore depositions in this rock are much later than the geological age in which the granite was predominant. The aqueous theory conveniently fits the facts; few geologists attempt to bring forward any other explanation.

COPPER alloys easily with silver; argentiferous copper is produced in the smelting of argentiferous copper ores, or when silver and copper ores are smelted together. Silver can be separated from copper alloys by electrolysis, or, if treated with mercury, the silver is taken up by the latter metal. If the alloy be melted with lead, a silver-copper-lead alloy is obtained, and if this be heated to a higher temperature than the melting point of lead, a lead-silver alloy flows from it, leaving behind the copper, deprived of the greater portion of silver (liquation). If the silver-copper alloy be powdered and roasted with common salt, the silver is converted into silver chloride, the copper being then present mainly as an oxide. If the alloy be melted with an excess of sulphur, sulphides of both metals are produced (matte); but if an insufficient amount of sulphur is present, it combines with the copper, and silver separates in the metallic state.

THE average coefficient of friction for the moving parts of a haulage system may be taken at one-fortieth of their weight. When this weight is that of both cables, the empty cars passing into the mine and the loaded ones coming out, this coefficient represents the tension of the main rope; while the tension of the tail rope is equal to one-fortieth of the weight of the moving parts when the cars are empty. If the tension of the main rope be multiplied by the velocity of the train in feet per minute, the result represents foot-pounds of work done in this length of time. Then by dividing this by 33,000 gives the horse power required to operate the plant. Thus suppose the line is 2000 feet long, the weight of the main rope per foot is eight-tenths and that of the tail rope six-tenths of a pound. The number of cars in each load is twenty, their weight when empty is 1500 and when loaded 4000 pounds each, while the maximum speed of the train is 10 miles per hour. Then the weight of the loaded train is 80,000 pounds, and that of the two cables 2800 pounds. The tension of the main

rope is therefore, $\frac{80,000 + 2800}{40} = 2070$ pounds. The weight of the train of empty cars is 30,000 pounds, and the tension of the tail rope is $\frac{30,000 + 2800}{40} = 820$ pounds. Now, as the maximum speed of the train is 10 miles per hour, its velocity per minute is $\frac{5280 \times 10}{60} = 880$ feet. The work done by the main rope is, therefore, $2070 \times 880 = 1,821,600$ foot-pounds per minute, or $\frac{1,821,600}{33,000} = 55.2$ H. P.

IN the cyanide process solution of the gold does not take place in the absence of oxygen or an oxidizing agent. It is doubtful whether the efficiency of ferric chloride and halogens is due to their oxidizing power or to their direct affinity for potassium. In most cases with tailings poor with gold and free from sulphides, the air entangled in the ore is sufficient, while with ordinary pyritic tailings oxygen is generally supplied by double treatment, aeration taking place during the draining off of the first solution. The most difficult materials to treat are slimes containing ferrous sulphide, which results from the decomposition of pyrites during the accumulation of the slimes. These slimes must be thoroughly oxidized by mechanical aeration, and, if necessary, by permanganate of potash. On the other hand, too much oxygen means a large destruction of cyanide, and judgment must be used to obtain the most economical result. A dilute solution is as efficient as a strong one if the supply of oxygen be not increased as well as the concentration. With slimy ores, which, owing to mechanical difficulties, require prolonged treatment, there is no necessity to hasten the solution of the gold, and it is better to use a dilute cyanide solution, which suffers less waste, than a strong one. The objection formerly raised, that the gold could not be entirely recovered from a dilute cyanide solution by means of zinc, has been overcome by using the zinc in threads, with a very large surface, and by prolonged contact. The electrical processes for the precipitation of the gold have been of benefit in the treatment of very dilute solutions, but the electrodes must be large and very close together to overcome the great resistance of the dilute liquid. Anodes of iron or lead peroxide and cathodes of sheet lead are used, and it is best to have a slight excess of potassium cyanide present to prevent the precipitation of gold cyanide along with the Prussian blue produced. Very clayey slimes have been successfully treated by circulation as a pulp with very dilute cyanide solution through a centrifugal pump with admission of air, and subsequent settling in large vats, and filtration of the decanted liquid through sand. The solution must be absolutely clear, and a low current density of not more than 0.04 ampere per square foot should be used.

Treatment of Gold Ore.

To THE EDITOR:—The present methods for the extraction of gold from its ores may be classified as follows:

Milling processes.—Milling and amalgamation; milling and amalgamation, followed by concentration; concentration followed by milling and amalgamation.

Chemical processes.—Cyanide leaching, chlorination, bromination.

Smelting processes.—Lead smelting, copper matte smelting, pyritic smelting.

While numerous patented processes have been proposed, those which have proven successful may be considered simply as modifications of the above.

The ores of California, until considerable depth is gained, consist principally of quartz and schists carrying free gold. For these ores the California stamp mill is a successful machine, being an effective crushing apparatus; and as the amalgamation of the gold is simple, this method results in many cases in the saving of from 80% to 90% of the gold contents of the ores. As considerable depth has been gained in many of the mines the ores have changed to sulphides, the result being that the amount of free gold, or gold which can be saved by this simple amalgamation, is much less than in the upper workings. This has resulted in the introduction of vanners, bump tables or some suitable concentrating machinery below the amalgamated plates, to endeavor to save the escaping sulphides which carry a considerable portion of the fine gold. While this method results in an increased saving when handling the sulphide ores, the saving is in many cases far from satisfactory, owing to the difficulty of successfully handling these extremely fine sulphides by concentration.

The surface ores of Colorado are similar to those of California except that the oxidized portion of the Colorado veins extend to comparatively slight depths (frequently less than 100 feet), while the oxidized area of the California veins is generally much greater, extending frequently to a depth of 700 feet. These varying conditions have led to different methods of stamp milling. With the sulphide ores of Colorado, the successful extraction of the gold by amalgamation requires fine crushing and the introduction of amalgamated plates inside of the mortar. The Colorado practice involves fine crushing, and this necessarily results in the production of a maximum amount of slimes. The fine crushing of these ores is essential to effective amalgamation, as the gold is usually extremely fine, and is intimately combined, or associated with the pyrites and other sulphides. This fine crushing is not only an expense, the amount crushed per stamp being much less than in the California practice (about one ton to three tons per stamp per twenty-four hours), but it also results in the production of a large amount of extremely fine sulphides, which generally contain considerable gold escaping amalgamation, thus entailing loss, as they can only be partially recovered by concentration. According to the above classification, the third method consists of coarse concentration followed by amalgamation.

As most of Colorado sulphide ores are extremely friable, fine crushing (as stamp milling) necessarily results in the production of a large amount of slimes, which frequently carry off mechanically large amounts of the precious metals. By coarse crushing and proper sizing, the amount of slimes may be reduced to a minimum. By this method most of the contained particles of sulphides are left in a coarse condition when they can be readily separated from the worthless gangue by comparatively simple and inexpensive means.

After the separation of these heavy sulphides, the tailings, should they carry precious metals (which is often the case with Colorado ores), are in the best possible condition for treatment by amalgamation. They are already quite finely pulverized, and, as most of the heavy sulphides have been removed, they are in ideal condition for treatment in a California stamp battery.

After this treatment, with many of Colorado ores the tailings from amalgamation will still contain considerable sulphides which were originally finely disseminated through the gangue. A portion of these, together with their precious metal contents, may be saved by passing the material over vanners, bump tables, buddles or other suitable slime-concentrating machines.

I have not seen anything in the MINING AND SCIENTIFIC PRESS of late concerning this important question of rapid-drop or slow-drop crushing. It is a matter of constant interest to millmen everywhere.

Black Hawk, Colo., Aug. 16. R. E. W.

So much has been said and sung thereon that anything new now would not be good and anything good would not be new.

This subject has been well threshed out, and it is difficult to add anything of value. The California free-milling gold quartz doesn't need the fine comminution required by some Colorado ore. A cracking of the quartz to liberate the small particles of gold in most cases suffices in the case of free-milling gold ore of that type, whether it be in California or elsewhere.

The matter is a good deal like the question of

Cornish pumps vs. underground pumps. The writer has worked where nothing but a Cornish pump was deemed worth considering, and, also, where a Cornish pump wouldn't be allowed on the place. It is the old principle of suiting the process to the ore, not the ore to the process. Whatever pays best—that is the best to use.

It is believed that the best thing written of late years on this subject from a California standpoint was a lengthy monograph on stamp mill practice by Dana Harmon of Nevada Co., Cal., which with several illustrations appeared in full in the issue of Dec. 2, 1900. That issue is now, however, out of print.

A New Nevada Mining District.

Through the courtesy of Mr. H. F. Lange of San Francisco, Cal., is published herewith some data concerning the new mining district in northwestern Nevada. This, it is believed, is the first authentic information of the kind regarding that region:

Donnelley mountain mining district lies on the western slope of one of the foothills of the Blackrock range, variously known as Donnelley mountain, Cold Spring mountain or Division peak, in the county of Humboldt, State of Nevada, at an elevation of from 7500 to 8200 feet above sea level, and approximately at township 40 north, range 25 east, Mount Diablo base and meridian.

It is reached from Amadee, or Hot Springs, on the Nevada, California & Oregon Railroad, by team or saddle, the distances between water or stopping places being as follows: Hot Springs to Mape's ranch 4½ miles, + 20 miles Mud Spring or Bull's, + 5 miles Rush creek, + 2 miles Smoke creek, + 10 miles Sheephead, + 6 miles Salt Marsh, + 20 miles Deep Hole (or + 18 miles Walled Spring and 6 miles Deep Hole), + 25 miles Granite creek, + 25 miles Donnelley mountain; total, 117½ miles, or from Humboldt, Nev., on the Southern Pacific, via Rabbit Hole Springs, a distance of 80 miles. The roads are first-class, the water of good quality and sufficiently abundant to obviate the necessity of hauling same for the use of stock.

The surface of the country is largely formed by the dried basins of former great lakes. From these plains numerous parallel mountain ranges, having a general north and south course, rise to a height of from 1000 to 2000 feet. The plains are alkaline, barren and waterless, but springs of pure water are found on the hillsides, carrying in some instances 100 (Granite creek) to 150 (Cottonwood creek) miners' inches, but more frequently 3 to 7. The bench lands are free from alkali and of surpassing fertility, and wherever irrigated yield phenomenal crops of timothy and alfalfa, while in its natural state the entire country affords excellent grazing, and many thousand head of beef cattle and range horses are annually reared for market. No timber is found near the mines, but the homely sagebrush is abundant and is suitable for fuel, often growing to the thickness of a man's thigh. The Mahogany range, 15 miles to the westward, is well covered with the timber which gives it its name, and the trees are said to average 12 to 14 inches in thickness and 20 to 30 feet in height. A sawmill is at Surprise valley, 50 miles north, at which a fair quality of pine lumber is furnished.

At Deep Hole and Clear creek, 3 miles apart, and at Granite creek and Cottonwood creek, 2 miles apart, are the ranches of the Gerlach Cattle Co., each comprising several hundred acres of cultivated land, including orchards and vegetable gardens, which might supply the needs of a mining camp. At present a weekly stage runs from Amadee as far as Deep Hole, and a postoffice is located at that point.

The general formation of the country is granite with an occasional dike of porphyry and some lime. Overlying this is a heavy capping of lava from 2 to 30 feet in thickness. This flow is irregularly distributed and the underlying formation is frequently exposed.

The veins are true fissures and from 1 to 4 feet in thickness. Although at some points they appear to lie in blanket form, all have a uniform dip of, approximately, 40° to the northeast and a strike nearly northwest and southeast.

The veins developed in the district at the present time are four in number, known respectively as the Donnelley, Perry, Antelope and O. K. The ore is free-milling quartz, showing some galena and pyrite, much of which is oxidized. The walls are well defined, but no gouge has been developed at any point.

The Donnelley lode was first to be discovered and is the one farthest to the east. It is from 12 to 16 inches wide and can be traced on the surface for more than one-half mile. In character of ore this lode differs somewhat from the others of the district, the white quartz frequently inclosing fragments of a brownish or black color apparently identical with the neighboring lava. The latter are heavily impregnated with fine gold and contain many specimens of great beauty, having a value of several thousand dollars per ton.

Owing to the occasional coarseness of the gold, it is difficult to secure a homogeneous sample of the entire ledge, returns of fabulous richness being often

received. It may be safely assumed, however, that these fragments will in no instance reduce the value of the whole. An average of four samples, taken across the ledge, representing a length of 200 feet on the vein, gave a trifle over \$57 per ton. In taking these only the quartz was disturbed, the spots previously referred to being carefully avoided.

At this point the granite juts out in the form of a hogback, from which the lava has been denuded. Across the hogback the vein crops strongly for a distance of several hundred feet. A considerable amount of quartz has broken from the ledge and is scattered along its course, and the surface dirt gives large prospects in the horn-spoon. At the time of the writer's visit two holes had been sunk to the required 10 feet. These being perpendicular, they had passed through the vein close to the surface, making the development practically zero.

After passing through the vein the holes showed several seams of quartz of an inch or less, all of which carried gold. The granite was solid and unbroken, but the feldspar more or less kaolinized, the rock crumbling readily in the fingers.

With, as has been said, no development, there were at a conservative calculation 200 tons of ore in sight, the value of which is not less than \$10,000.

The extension of this lode to the southeast is equally undeveloped and, owing to the lava cap, nature has not assisted its appearance.

The Perry lode or system of veins lies parallel to the above and about 700 feet west on the slope. This is the largest body of ore yet developed, the main vein being nearly 4 feet in width and several others cropping within a few feet, in widths of from 10 to 18 inches.

No developments had been made on the vein, but it is strong, permanent and readily traceable and two samples taken from the largest fissure at apparently promising points yielded respectively \$9.23 and \$37.62 to the ton. All the branches of this lode prospect well in the pan.

Mint Figures on Mine Yield.

G. E. Roberts, Director of the Mint, has issued his final estimate of the production of gold and silver in the United States during the calendar year 1901. According to Mr. Roberts' statement that year the United States produced 3,805,000 ounces of gold, valued at \$78,666,700—a decrease of \$504,300, or 0.636%, as compared with the year of 1900.

Ten of the nineteen States and Territories yielding gold showed an increased production, California giving an increase of \$1,075,200. Nevada showed a gain of \$957,600, South Dakota a gain of \$301,900, Idaho \$144,600, and Oregon \$123,400.

Alaska produced \$6,932,226 gold and \$66,499 silver. In 1900 the gold production of the Territory was \$8,166,187 and silver \$96,739. The decrease was due largely to a falling off at Nome on account of the short season and litigation. Out of the total gold production of the Territory \$4,110,712 came from Nome, with \$20,979 in silver. In 1900 Nome's gold and silver production was \$5,109,000. Southeastern Alaska produced last year \$1,981,775. The output of the Yukon, including the Klondike, received in the United States, was \$17,752,463 gold.

Colorado diminished \$1,139,900, a fact explained by the decline in the grade of ores extracted, the tonnage having increased. The silver yield for 1901 amounted to 55,214,000 ounces, of the commercial value of \$33,128,400, which was 2,433,000 ounces, or 5% less than it was in 1900. The greatest gain, 1,493,200 ounces, was in Utah, almost all of which came from the Park City district.

Nevada, New Mexico and Washington also made gains. The production of Colorado, owing to the decline in the grade of ores extracted, fell off 2,046,100 fine ounces, while Montana's yield diminished 1,063,700 ounces, Idaho's 886,200 and South Dakota's 458,200.

The total value of the precious metal produced by the United States in 1901 amounted to \$111,795,100, which was \$1,964,100, or 2% less than the yield for 1900.

The following statement shows the approximate distribution by producing States and Territories of the product of gold and silver in the United States for the calendar year 1901:

State or Territory.	Gold value.	Silver, commercial value.
Alabama.....	\$ 3,100	\$ 60
Alaska.....	6,885,700	28,740
Arizona.....	4,083,000	1,687,440
California.....	16,891,400	555,360
Colorado.....	27,693,500	11,602,680
Georgia.....	124,500	240
Idaho.....	1,869,000	3,327,540
Michigan.....	30,800	48,000
Montana.....	4,744,100	7,879,020
Nevada.....	2,963,800	1,087,500
New Mexico.....	688,400	338,040
North Carolina.....	55,500	12,180
Oregon.....	1,188,100	96,000
South Carolina.....	46,700	120
South Dakota.....	6,479,500	46,800
Texas.....	600	283,440
Utah.....	3,680,200	6,648,480
Virginia.....	5,300	420
Washington.....	280,500	260,600
Wyoming.....	12,700	12,800
Totals.....	\$78,666,700	\$33,128,400

Electrical Equipment C. & C. Shaft,
Virginia City, Nevada.*

By LEON M. HALL, Consulting Engineer.

When mining properties on the Comstock lode were first developed, operations were carried on by steam-generated power, wood being used as the fuel—very costly on account of its scarcity. The milling was until recently done 15 miles from the mine, on the Carson river, where cheap water power could be obtained. About two years ago the question of electrical transmission for supplying power for deep mining operations on the Comstock lode was taken up, and since then extensive hydraulic power has been produced at Floriston, Cal., on the Truckee river, power being transmitted 35 miles to the mines in Storey county, Nev., where a dozen or more properties have been equipped with electrical machinery. Among these is the C. & C. shaft of the Con. Cal. & Va. M. Co., which has a world-wide reputation as a bullion producer.

The power plant on the Truckee river is about 2

designed for a 4% drop under full load. The generating station at Floriston is constructed of brick, with a galvanized iron roof, and the sub-station at Virginia City is entirely covered with corrugated galvanized iron.

The plant has been in continuous operation since Oct. 20, 1900. The Truckee River General Electric Co. sells power to the various mining companies at \$7 per horse power per month, the amount used being based on a maximum peak load of two minutes duration. This, with other conditions, has made advisable the installation of machinery of the highest grade and the introduction of some features unique in character. In the C. & C. shaft at Virginia City every precaution has been taken to secure thorough reliability and the highest efficiency, and, after giving brief outline of the machinery in use, I will elaborate upon some of the more important features, as partially illustrated on the front page.

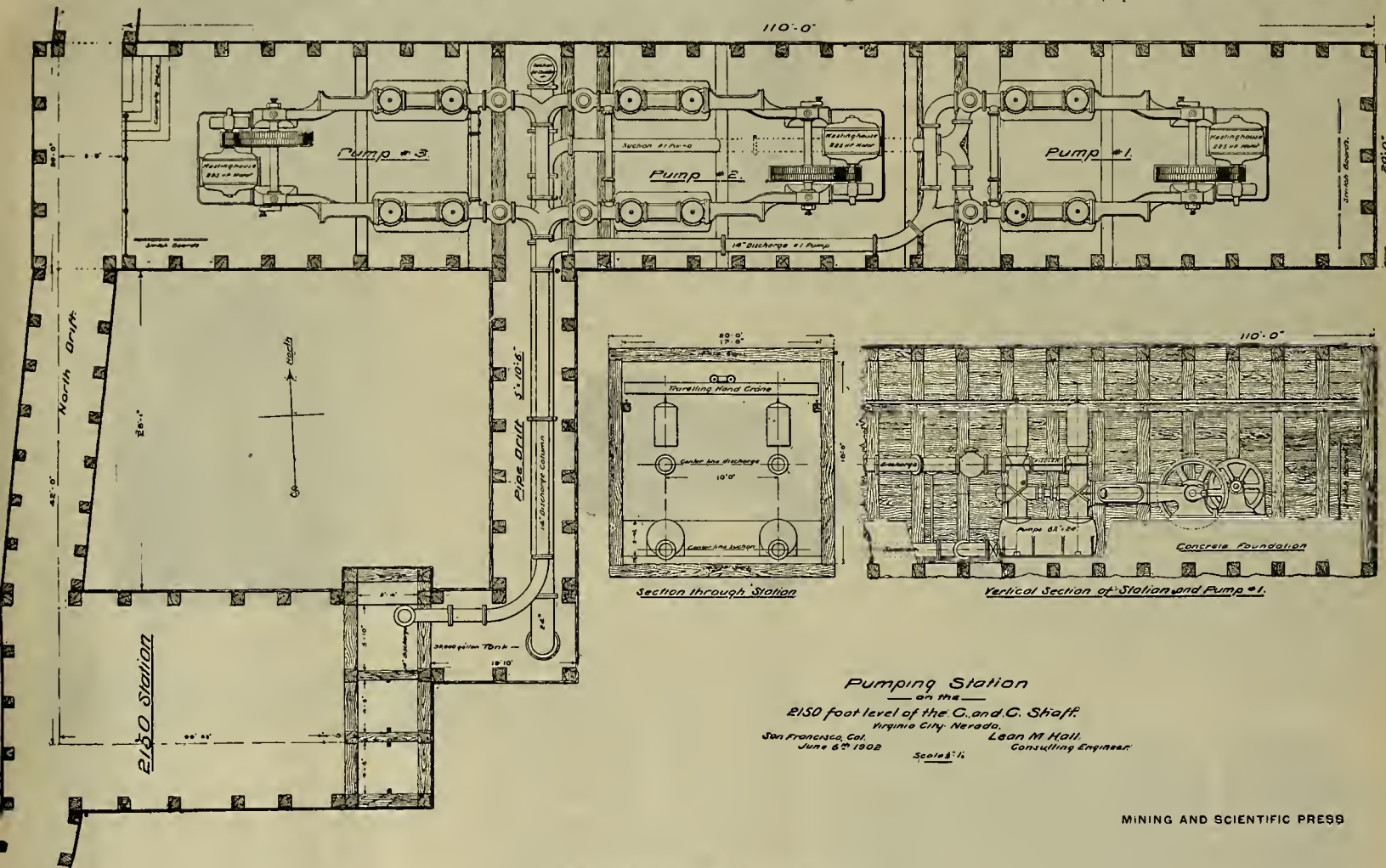
The electrical machinery in operation on the surface consists as follows:

A 200 H. P., type "F," 2200-volt, variable speed, 3-phase Westinghouse induction motor, geared to balanced electric hoist, which will be described later; a 100 H. P., type "C," 2200-volt Westinghouse in-

ply the motor and lightning circuits within the mine.

There are 250 16-candle power incandescent lamps scattered through the workings underground. A No. 6 B. & S. 3-conductor, lead-covered cable, armored with iron wire, extends from the surface to the 2150-foot level, and a No. 0, 3-conductor cable to the pumps on the same level. The weight of the No. 6 cable is six tons and of the No. 0 cable ten tons. The cables were lowered down the shaft by means of the hoisting rope and then securely clamped to the wall plates. At each station a watertight junction box is used and the lead covering sweated into a tight-fitting sleeve located in the side of the box.

The power is brought into the works over two separate circuits, each of which is provided with a single-pole switch at the entrance of the building, and, also, a Westinghouse integrating wattmeter, with its transformer. The pump circuit is further equipped with an ammeter, a frequency indicator, a power-factor indicator and a static ground detector. Oil-break switches are used on the cable circuits and upon all of the 2200-volt motors. The smaller motors, both on the surface and underground, are equipped with auto-starters, quick-break switches and slate-



MINING AND SCIENTIFIC PRESS

Electric Pumping Station at 2150-Foot Level.

miles east of Floriston. The river is dammed just below the Floriston Pulp & Paper Mill and the water is conveyed about 600 feet through a canal and then 8600 feet through a wooden flume, 6 feet 8 inches high and 10 feet wide, to a point directly above the generating station. It is then conducted through two wooden stave pipes, 160 feet long and 6 feet in diameter, to the wheels, upon which there is a head of 84½ feet. There are two pairs of 27-inch horizontal McCormick turbines, direct connected to Westinghouse 3-phase, 60-cycle generators of the revolving armature type. These generators are separately excited by two 22½ K.W. direct-current machines. The wheels will each develop 1400 H. P. at 400 revolutions per minute, with the above head of water. They are regulated by two type "B" Lombard governors. Current is generated at 500 volts and is raised to 24,000 volts by means of six 300 K.W. Westinghouse oil-insulated transformers, at which potential it is transmitted 33 miles over a double circuit of No. 4 hard-drawn copper wire to the sub-station at Virginia City. The line is composed of square redwood poles 30 feet in length, with pine crossarms and locust pins, upon which are mounted 7½-inch Locke insulators. The telephone circuit is carried on the same poles by oak brackets with pony insulators. At the sub-station at Virginia City the potential is lowered to 2300 volts by means of six 450 K.W. Westinghouse oil-insulated transformers, and at this potential current is distributed to the various mining companies. The distribution circuits are composed of weather-proof wire and are

duction motor, belted to a 16½x30-inch single-stage air compressor; a 30 H. P., type "C," 440-volt Westinghouse induction motor, operating circular saws; a 15 H. P. motor of the same type, driving tools in the machine shop; a 10 H. P., type "C," motor, operating a Blake rock breaker at the ore bin; three 15 K.W., indoor type, Westinghouse transformers, transforming from 2200 volts to 440 volts; one 5 K.W. Westinghouse lightning transformer, transforming from 2200 volts to 110 volts; two Manhattan arc lamps; fifty incandescent lamps, together with necessary lightning arresters, fuse blocks, cut-outs and switches.

The apparatus underground consists of the following: A 15 H. P., type "C," induction motor, operating at 440 volts and driving a fan on the 250-foot level; two 10 H. P. motors of the same type, driving fans on the 1950-foot and 2150-foot levels; three 225 H. P., type "C" motors, operating at 2200 volts, and geared to three duplex double-acting Reidler pumps, located on the 2150-foot level; three 10 K.W. type O. D., transformers, transforming from 2200 to 440 volts, located on the 1750-foot level; a 3 K.W. lightning transformer, transforming from 2200 volts to 110 volts, on the same level; three 15 K.W., type O. D., transformers, transforming to 440 volts, on the 1950-foot level; two 5 K.W., O. D., lightning transformers, transforming from 2200 volts to 110 volts, on the same level; three 10 K.W. transformers, transforming to 440 volts, on the same level; a 5 K.W. lightning transformer, transforming to 110 volts, on the same level.

These are all Westinghouse transformers and sup-

base fuse blocks. Some of these machines are located in warm places and operate under severe conditions.

The entire installation is wired with lead-covered cables or with rubber-covered copper wire mounted on glass insulators or porcelain knobs. The greatest care is used in installing the wiring, with the result that it is safe and gives absolutely no trouble. Candles have been entirely discarded, incandescent circuits having been carried directly to the working faces and into the stopes. The current is taken into the mine at a potential of 2200 volts through the cables above mentioned, and the potential is lowered in the mine by transformers, which are located as near as possible to the point of consumption.

The compressed air plant, supplying air for drilling, a number of underground hoists and the hydraulic pump, consists of a 16½"x30" Rand & Waring single-stage air compressor, driven at seventy-three revolutions per minute by a 100 H. P., type "C," Westinghouse motor. The motor speed is 580 revolutions per minute, which is reduced by a counter-shaft with wooden rim pulleys and rubber belting. No automatic regulator is used at the present time, as the compressor is working to its full capacity and the motor is developing 96 H. P.

The electric hoist is a decided departure from usual practice in deep-mine hoisting plants and embodies what is commonly known as the balanced, continuous or tail-rope system. This was adopted in order to reduce the cost of operation and, also, the size of the motor to the lowest size compatible with the duty required, viz.: to hoist 500 tons daily from

*See illustrations on front page.

the 2500-foot level by means of double-deck cages carrying 3600 pounds of rock. The hoist consists essentially of a main driving drum and an idler, around which is wrapped a 1½-inch plow-steel wire rope. The rope passes down one compartment, around a movable tail sheave and up the other. One cage is inserted between the ends of the rope and the other fastened to it by means of heavy iron clamps. The main driving drum is geared to a 200 H. P., type "F," variable-speed Westinghouse 3-phase induction motor, which operates at a maximum speed of 580 revolutions per minute, moving the cages through the shaft at 1250 feet per minute. The speed of the motor is readily controlled by means of variable resistances inserted in the secondary winding, but external to the motor itself. The variation of the resistance is accomplished by the use of a special controller, resembling an ordinary street car controller; the primary circuit is controlled by means of an oil-break switch. The hoist is equipped with heavy post brakes, hydraulically operated, and the machine is handled with remarkable ease. In tests that have been made, these hoists show a net efficiency of about 75%, counting all electrical and frictional losses. The pumping plant consists of three duplex double-acting 6½"x24" Riedler pumping engines, located on the 2150-foot level. These pumps take their water supply from a tank on the east side of the shaft just below the 2150-foot station. Each pump is separately driven by a 220 H. P., type "C," 2200-volt Westinghouse induction motor, and has a capacity, at 110 revolutions per minute, of 1500 gallons per minute to the height of 450 feet, or to the Sutro Tunnel level. The motors run at a speed of 495 revolutions per minute, the necessary reduction being obtained by the use of cut gearing with stepped teeth. The total capacity is 4500 gallons per minute and is intended to take water from the hydraulic elevator as long as it is used as a sinking pump.

The pumps are located in a station 30 feet north of the shaft. This station is cut from the solid rock and is 18'x17'8" in section and 110' long. It is timbered with 14"x14" pine timbers with 3" planking. A drift 5'x10'6" in section connects it with the shaft and ventilation is obtained by means of a small, electrically driven blower. The motors are all wired with lead-covered cable and the station is lighted with incandescent lamps. A 10-ton hand crane travels the entire length of the station, so that the labor of handling and installing machinery has been reduced to a minimum.

This plant is undoubtedly one of the best and most complete mining installations in the world, and its operation has been entirely satisfactory, both in regard to economy and reliability. Up to the time when electrically transmitted power was adopted, the cost of motive power was never less than \$20 per horse power per month, while under existing conditions it is reduced to \$7. For example, the cost of operating the 100 H. P. air compressor usually averaged about \$1800 per month, while to-day it is only \$672. The entire plant was installed according to my plans and specifications and under the able direction of Superintendent Jos. R. Ryan. It has proved an unqualified success from the very beginning.

Experiments on "Fireproof" Woods.

A series of experiments with "fireproof" woods was made in the heat laboratory of the Massachusetts Institute of Technology last week, the first practical work of the new school of insurance engineering. The tests were conducted by C. L. Norton of the institute and several assistants, the insurance engineering school being especially represented by E. Atkinson, its director.

To begin with, samples of different kinds of wood in their natural state and after treatment by various fireproofing processes were held in the flame of a Bunsen burner which gave a heat approximating 3500° F. In a general way, the prepared wood burned less freely while it was in the blaze and glowed a shorter time after it was taken out of it, but in the end both kinds showed about equal consumption. Fireproofed pine suffered a less percentage of consumption than plain pine—a proportionately greater difference than was shown by oak. The best of the prepared samples lost all trace of flame within from one to ten seconds after being removed from above the burner, while those in their natural state continued to blaze, and afterwards to glow, for some minutes.

A test to determine the comparative length of time in which two sticks, one of which was fireproof and the other non-fireproof, would burn through showed that, in general, the treated wood lasted about a minute longer. When subjected to heat in a furnace even the most enduring of the prepared material was turned to charcoal.

These experiments were made with small bits of wood. To determine the effect of fire on large pieces Prof. Norton placed over furnaces, for five minutes, two boxes without ends—one 28 inches long and 3 feet square, and the other a little shorter; one of whitewood and one of pine, and each treated with a different fireproofing process. Although the pine box charred inside it ceased to burn soon after the fire was withdrawn from beneath it. The whitewood, however, continued to glow, and in time the lower

part turned away and a hole appeared in one side, and the effect on a hardwood box was similar. When dropped on a plate of red hot iron the fireproof woods only charred at the point of contact, while the untreated woods blazed; but in an electric muffle, where heat of about 1800° F. was supplied on all sides, none of the fireproofing processes gave sufficient protection to enable the samples to resist the flames.

For a final experiment two coh houses were built, each of eight tiers, one of fireproof sticks and the other of non-fireproof. In both all kinds of woods and all the different methods of treatment were mingled. Fire was applied to each for five minutes. The house of untreated wood broke into flame quickly and at the end of five minutes was wholly ablaze, while the fireproofed house was untouched above the fifth tier and even that part which had caught was not burning readily. The untreated wood burned considerably longer than the fireproofed, standing less than five minutes after the fire had been withdrawn, while the structure of prepared blocks remained upright for ten minutes. After the houses had fallen the plain wood continued to blaze considerably longer than the other.

It was developed that samples treated with fireproof paint withstood the attacks of the flames fully as well as those treated with solutions that completely soaked the fibre.

The Shattuck Patent Solar Attachment.

Wm. Ainsworth & Sons of Denver, Colo., have placed upon the market a new and improved solar attachment, designed and patented by O. F. Shattuck of that city. The attachment is arranged to fit over the objective end of the telescope in place of the cap, to render it easily detachable and designed to make it unnecessary to send a transit to the factory to have it fitted, provision being made for an engineer to give the accurate dimensions required and place his order when in the field, effecting a saving in transportation charges and time.

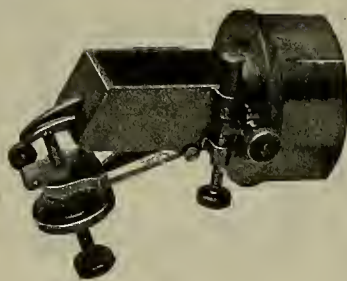


FIG. 1.

This solar attachment is designed by its makers to overcome by its optical construction the polar adjustments sometimes so difficult to maintain, being dependent only on the accuracy of the vertical arc and limb, the two most carefully constructed parts of the transit, giving results commensurate with the accuracy of the instrument to which it is attached.

Fig. 1 shows the attachment three-fourths actual size. For instruments having no vertical arc, a latitude level is provided at small expense.

The manufacturers say the reliability of the solar attachment shown herewith depends upon principles similar to those of the sextant, i. e., that a ray of light which suffers reflection twice in the same plane is bent at an angle with its original direction equal to twice the angle between the two reflecting surfaces.

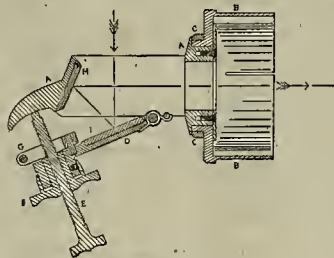


FIG. 2.

Referring to Fig. 2, which is a sectional view in the plane of the attachment about three-fourths actual size, the main frame AA carries the stationary mirror H and revolves axially by means of a bearing in the cap B, which fits over the objective end of the transit. C is a clamp ring used in connection with the clamp and tangent screw (not shown) for rotating the frame AA about its axis. The movable mirror I is adjustable to any required angle, being mounted on a swinging arm D, which is provided with an adjusting screw E, a graduated differential nut F and a clamp G.

The ray of light enters from above, as indicated by the arrow, and is incident upon the movable mirror I. It is thence reflected to the stationary mirror H, thence in through the object glass to the cross wires of the instrument. Thus the maintenance of the

angle between the incident and emergent ray depends upon the angle between the mirrors rather than upon the polar bearing.

The declination angle corrected for refraction is set off by means of the movable mirror actuated by the screw E and the differential nut F, the method being to sight at some object on the horizon (B, Fig. 3), with the solar attachment off, the telescope level and the vernier set at zero. Then with the lower plate clamped and the vernier set at the south

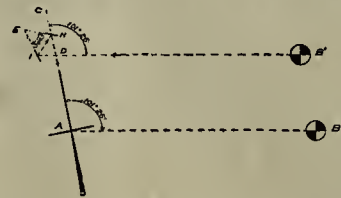


FIG. 3.

polar distance, corrected for refraction, which has been previously computed, sight at the same object (B', Fig. 3), with the solar attachment in place, bringing the object onto the cross wires by means of the adjusting screw E and the differential nut F.

Then, referring to Fig. 3, angle CDB' equals angle CAB. If the object sighted be less than 5000 or 6000 feet distant, allowance is made for parallax by making the distance BB' equal to the distance from the axis of the telescope A to the optical center of the solar attachment.

Now depress the telescope to the latitude of the place of observation (see Figs. 4 and 5), revolve the solar about its axis and the transit in a horizontal plane until the image of the sun is brought to the proper position on the cross wires. The line of collimation then becomes the polar axis with the transit in



FIG. 4.

the meridian, and the solar revolved about its axis will follow the path of the sun. The engineer, having carefully set off his angles, and knowing that his transit is in adjustment, is assured of reliable results.

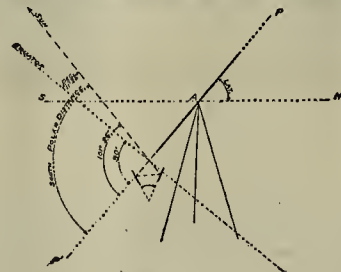


FIG. 5.

Fig. 4 shows an operator making an observation to determine the meridian. Fig. 5 is a graphic illustration of the same when the sun's declination is north 11° 26', A being the axis of the telescope and PP' the polar axis, coincident with the line of collimation.

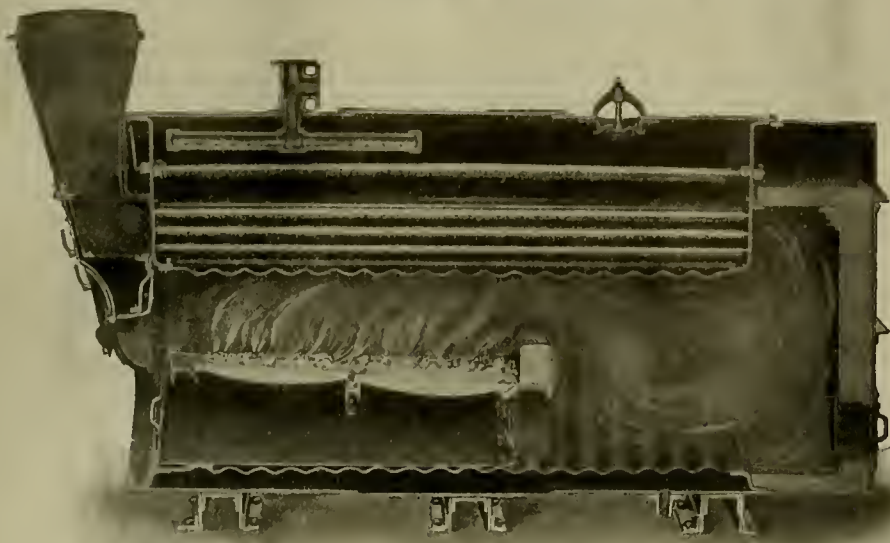
After the transit has been set in the meridian the reading of the differential nut is taken and the attachment is removed. It weighs less than three ounces and may be carried in the pocket without fear of damage. In taking subsequent observations during the day as a check on the work, it is only necessary to set off the hourly change in declination by means of the graduated differential nut, each division of which represents one minute of arc, place the attachment in position, and if the instrument be in the meridian the sun will come to the proper position on the cross wires. The manufacturers say that another valuable feature of this solar attachment is its adaptability to underground surveying. In connection with the delicate level under the transit telescope, it is especially useful in carrying accurate traverse lines up or down shafts or steep inclines in the same manner as with side and top telescope.

A catalogue giving complete description will be mailed on request by Wm. Ainsworth & Sons, sole manufacturers, Denver, Colo.

Internally Fired Boiler.

The Holthoff Machinery Co. of Cudahy, Milwaukee county, Wis., have put upon the market an internally fired boiler, with Morison suspension furnace, as illustrated herewith, which they are building to meet the demand for a boiler that will occupy small space and in which the necessarily high pressure steam can be economically generated.

It will be noted that the boiler is somewhat similar



Internally Fired Boiler.

in general design to the Scotch boiler so extensively employed in marine use. The boiler requires comparatively little floor space and head room, is self-contained, requires no external brick work, possible complications incident to a brick setting being thus obviated, the only brick work required being the combustion chamber, which is lined with one layer of fire brick to prevent the escape of heat through the rear wall, and which becoming white hot maintains an even temperature, insuring combustion of the gases and tending to prevent smoke. The manufacturers say the internally fired boiler is economical in the consumption of fuel, because there is no brick work to absorb and radiate the heat; the furnace is surrounded by water and the heat of combustion is more fully utilized than is possible in externally fired boilers.

The corrugations in the Morison furnace are designed to be of sufficient strength to withstand the crushing strain present in every high pressure boiler, and tend to serve as haffle plates on the interior of the furnace, retarding the progress of the flame and gases and facilitating combustion. These corrugations in the Morison furnace are a series of expansion joints, designed to relieve strain on the rivets in the head.

The internally fired boiler is built in sizes of 75, 100, 125, 150, 200, 250 and 300 H. P., and for pressures of 100, 130, 160 and 200 pounds per square inch, the larger sizes being equipped with two furnaces. The design, however, is susceptible of modifications by the manufacturers to meet special conditions.

By-Products From Rand Stamp Mills.

In the process of amalgamation are the inside copper plates, the screens through which the pulp passes and the outside copper plates, brushes and rags that are used to clean the plates with, the screen frames, mortar hoxes, shoes and dies; all these come in contact with the gold and quicksilver and take up more or less amalgam. The ordinary clean-up gives the plate scrapings, which contain, besides the gold amalgam, particles of iron, sand, iron pyrites, especially magnetic iron pyrites when present, bits of copper, sometimes a little grease, and various colored metallic films that spread over the plates as a result of the decomposition of pyrites and other sulphur compounds. This amalgam is then cleaned by grinding and washing, generally in an amalgamating barrel with various chemicals, such as lime, cyanide of potassium, and other chemicals special to the individual amalgamator. Into this barrel is also put the ashes which result from the burning of the chips, rags, brushes, scalings from the screens, the cleanings around the dies, and all the odds and ends around the amalgamating room that may contain a little amalgam. As a rule, this harrel is a grinding barrel, and its products at the finish of the operation are clean amalgam, fine silica, slime, and water containing various chemicals. At many of the best mills, when the harrel is empty, all these various products

are saved, because complete amalgamation of all the gold contained in the harrel has not by any means taken place. Some of the quicksilver has been floured, some of the hard amalgam has been ground up into an impalpable powder, and in the grinding up of the pyrites some of the amalgam adhering to the fine grains of pyrites is floured. Where cyanide has been used, which is frequently the case, some of this floured gold has been dissolved. Hence, besides looking after the amalgam from this barrel, the sands and slimes should be carefully settled and the water drained into a collecting

5.33 cents, and so on. The better the quality of the road the less the cost in transportation, so that it is economy to build good roads.

Restricting Inventions by Standardization.

It is a mistake to think that what is now known in the industrial world as standardization has arisen from the development of modern machinery. Primarily, standardization is the attempt of the human race to save brains, which are dear and scarce, at the expense of hands, which are cheap and plenty. The first set of flint arrowhead makers in the palæolithic age were artists and inventors; the second set were artistic imitators of the first set; the third set were common laborers making the standardized article by rule of thumb.

Modern standardization of machinery was made possible by the manufacture, by Sir Joseph Whitworth, of measuring instruments of sufficient accuracy to make the variation between like parts turned out from the same machine not more than one-thousandth of an inch. The standardization of parts is an economical gain so long as its practice does not operate to prevent designs based upon new inventions from being carried into effect on account of the cost of their production in upsetting existing standards.

But it must not be forgotten that, looked at from one point of view, standardization is equivoction so far as the standardized part is concerned. Imagine, for example, a newly invented screw machine which would turn out screws at half the present cost, but only at a pitch different from the standards now in use. It would take years of effort and a lavish outlay of capital to overthrow the vested interests which have grown up around the present standard pitch of screws. Moreover, in the broadest sense, the industrial unit which runs to as nearly as possible complete standardization of its products is in great danger of having ultimately a set of automaton turning out its work. So that when improved processes, demanding intelligent skill, come up, the unit is found wanting in flexibility and adaptability, and is, therefore, easily passed in the race by some younger rival which has not had the chance to make standardization a fetish.—E. H. Mullin, in *Cassier's Magazine* for September.

Red Cross Antiseptic Telephone Mouthpiece.

Description: A shows the outer shell of vulcanized rubber or other suitable material broken in places to expose the inner perforated lining B. C shows bell or front of the mouthpiece, natural size, and also perforations in the inner shell or lining, through which moisture from the breath or other impurities, typhoid or consumptive germs, or bacteria of any kind pass through a receiver F, pierced by two holes D, on opposite sides into a cup E, containing antiseptic material, by which all offensive germs are instantly destroyed or rendered harmless. G shows the



threaded vein connecting the inner and outer shells of the mouthpiece proper, inside which is a perforated disk H, which in combination with the wire screen I, connects the mouthpiece with the diaphragm of the telephone, preventing the lodging thereon or in the recesses of the instrument of dust, insects or filth of any kind. This has been patented by W. English and G. A. Burns of San Francisco, Cal.

The cost of moving one ton by horse power over 1 mile of dry, sandy road is 64 cents; over wet sand, 32 cents; over ruts and mud, 39 cents; over an earth road, dry and hard, 18 cents; over a broken stone road in good condition, 8 cents; over a compact gravel road, 8.8 cents; over wood or stone paving,

An industrial exhibition is to be held at Johannesburg, South Africa, to embrace mining machinery, motive powers, tramways, etc. The arts and sciences will also be represented. It is designed to be "the largest gold exhibition the world has ever seen."

Oxidizing Agents in Cyanide Mill Solutions.

Written for the MINING AND SCIENTIFIC PRESS by J. T. TERRY, JR.

Very little has been written regarding the use of oxidizing agents in cyanide mill solutions, although it is well known that oxygen is essential for the dissolution of gold in cyanide solutions and that oxidizing agents hasten and improve the extraction of the precious metal.

In experimenting of tailings assaying about \$8 per ton that were being treated by the intermediate filling process, with solutions from $\frac{1}{10}\%$ to 1% KCN, the best results were obtained with a $\frac{1}{10}\%$ KCN solution extracting 70% of the value with a consumption of $\frac{3}{10}$ to 1 pound of KCN per ton of ore treated. By the addition of two ounces of sodium peroxide per ton of ore to the solution the extraction was never less than 90%, but the consumption of cyanide increased to nearly two pounds and the zinc consumed averaged one and one-half pounds per ounce of gold precipitated. The precipitate recovered assayed approximately \$35 per pound avoirdupois, whereas it had been about \$80 when the ore had been leached with simple potassium cyanide solution.

Although the addition of sodium peroxide increased the extraction, it caused the fouling of solution to a certain degree, as it became dark-brown and turbid, owing possibly to the action of the caustic soda on the wood and filter cloths. Considerable floured mercury in the tailings was oxidized and dissolved by the solution precipitated on the zinc, causing it to become brittle and choke the screens. After making experiments with other oxidizing agents, such as potassium chlorate, nitrates, permanganate and calcium hypochlorite, I found the latter to give very satisfactory results and without any of the objections met with in the use of sodium peroxide and I am now using this agent in working a twenty ton leaching plant. The ore is crushed in Huntington mills through forty-mesh screens and pulp run into oblong cement settling tank, 8 feet wide, 30 long and $2\frac{1}{2}$ deep, the slime-water escaping over a baffle board and running to a slime pond. The sand is shoveled over the edge directly into the leaching vats, there being three of these, 14 feet diameter by 4 feet, and drained. Chloride of lime (bleaching powder), amounting to one pound per ton of ore, is sprinkled over the surface and the cyanide solution run on the displaced moisture is allowed to run off through a drain pipe till it shows cyanide and it is then directed to the weak sump. The strength of the solution I now use is $\frac{1}{10}\%$ KCN to $\frac{1}{100}\%$ KCN. The extraction is remarkable, after twenty-four hours contact being from 95% to 98% of the assay value, with a consumption of one pound KCN per ton of tailings, the consumption of zinc about one pound per ounce of gold recovered and the precipitate assaying about \$49 per pound avoirdupois. The precipitation is practically perfect and is effected in the first, second and a very little in the third compartments of the zinc boxes. When sodium peroxide was used in the solution the precipitation was imperfect and was diffused even to the last (the eighth) compartment.

The solutions are as clear as rain water. When the tailings were treated with the same strength solution, $\frac{1}{10}\%$ to $\frac{1}{100}\%$ KCN, without the addition of calcium hypochlorite to the charge, the extraction was only 41% of the assay value. I believe that the addition of calcium hypochlorite to tailings, sprinkled over the surface or slacked in dilute solution and the mass poured over the surface, if being worked by the intermediate or direct filling methods, or mixed with the tailings if charged into the leaching vats dry, will yield very satisfactory results. Increasing the extraction and reducing the cost of treatment, as a very dilute solution, will give better results and in a much shorter time than a stronger solution without the use of this agent.

Altar, Sonora, Mexico.

A RECENT issue of Engineering gives some interesting data of steps taken by the Bethlehem Steel Co. to reduce the cost of shoveling coal, ore, etc., and several specialists were engaged to study the problem. It was found that the time taken to insert a shovel into a pile was shorter if it was shoved into the top instead of the bottom of the pile. It also varied with material, taking longer for coke than sand, and, of course, with the man also, a powerful laborer taking twenty-two pounds at each shovelful, while the average was not more than twelve to fourteen pounds. As a result of this investigation, new sets of shovels specially adapted to different kinds of work were used, and, instead of sending a man out in the morning with a shovel, and allowing him to carry it all over the premises and use it indiscriminately on coke or ore, shovels of different sizes and shapes were used for different materials. The result of the study of this problem has been that the work which required the services of 400 men, at \$1.15 per day, is now done by 85 men, who are paid \$1.85 per day.

THE latest from Thomas A. Edison: "I believe that within thirty years nearly all railways will discard steam locomotives and adopt electric motors, and that the electric automobile will displace the horse almost entirely. In the present state of science there are no known facts by which one could predict any commercial future for aerial navigation."

Mining and Metallurgical Patents.

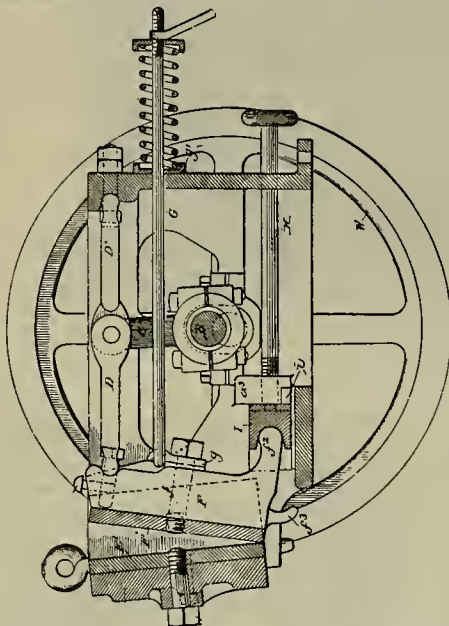
Patents Issued August 19, 1902.

Specially Reported and Illustrated for the MINING AND SCIENTIFIC PRESS.

PROCESS OF TREATING ORES.—No. 707,107; J. Herman, Canon City, Colo.

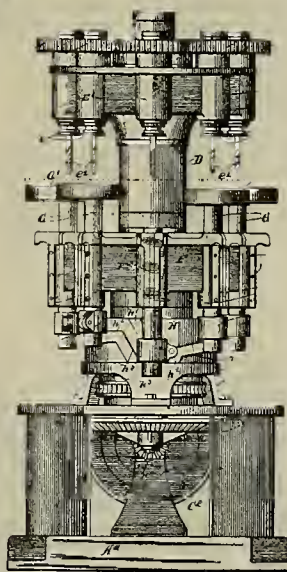
Roasting sulphide of copper ore at low heat to form sulphates of copper and some of iron present, produce a large percentage of ferrous sulphate, leaching roasted ore, precipitating metallic copper, adding salt to leaching solution, before or after precipitation of metallic copper, whereby ferrous salts in solution are converted to chloride and solution having an excess of salt is produced, solution adapted to dissolve copper and silver out of carbonate and oxide ores.

ORE BREAKER.—No. 707,385; A. C. Calkins, Los Angeles, Cal., assignor to F. W. Braun, Los Angeles, Cal.



In an ore crusher, combination with inclosing casing open at one end, having perforated lugs at open end on each side; of removable jaw having corresponding perforated lugs adapted to register with lugs of casing, two pins passing through registering lugs to secure jaw in place, set screws passing through jaw and bearing against casing to take up looseness in joints between jaw and casing; combination with stationary jaw and vibratory jaw having heel at its lower end; adjustable heel block having fulcrum seat for heel of jaw in front and guide lugs in rear, main frame or casing having on each side inwardly projecting lug arranged behind heel block, having screw-threaded hole through it, adjusting screw on each side tapped through lug, bearing against heel block, extending outside of casing and provided with handle.

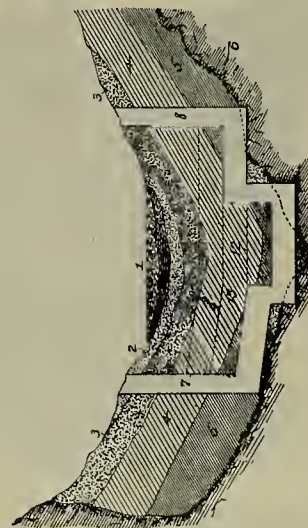
DRILLING MACHINE.—No. 707,507; F. N. Gardner, Beloit, Wis.



Combination with vertical column, of revolving work-table support, annularly arranged, rotative drill spindles revolving with work-table support, work tables located severally beneath drill spindles,

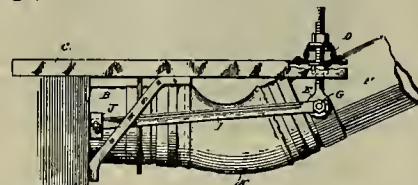
provided with stems which have sliding, non-rotative engagement with work-table support, concentric, stationary cam ring below work-table support, provided on cylindric surface with upwardly facing cam shoulder, collars surrounding lower ends of stems, laterally directed bearing rollers on collars adapted for engagement with cam shoulder, collars being provided with inwardly projecting parts adapted to enter longitudinal grooves in stems, capable of longitudinal movement on stems to permit vertical adjustment of collars, stops in grooves adapted for engagement with projecting parts of collars to limit vertical adjustment of collars on stems.

METHOD OF BUILDING SUBAQUEOUS FOUNDATIONS.—No. 707,093; J. T. Ford, Cartagena, Colombia.



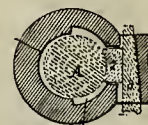
Method of constructing subaqueous foundations consisting in first sinking shafts on opposite sides of water, safe distance from water's edge down to bed-rock, then tunneling along bedrock from shaft to shaft, cementing tunnel walls to desired thickness, then building tunnel on tunnel until desired height is reached.

HYDRAULIC DREDGER.—No. 707,293; L. W. Bates, Chicago, Ill.



In combination with pontoon, discharge pipe carried thereby; arms or levers C extending outwardly from pontoon; bridge piece extending across between arms; eyebolts extending down from and adjustably secured to bridge piece; shore discharge pipe F; trunnions connected to pipe bearing in eyes of eyebolts; radius bars connected to trunnions pivotally connected at opposite ends to pontoon; flexible section H interposed between discharge pipe on pontoon and shore discharge pipe.

STAMP TAPPET.—No. 707,259; C. C. Rueger, Butte, Mont.



Stamp tappet having bore longitudinally through it, approximately half bore being of such radius as to fit tightly about stem, other opposite portion of bore having larger diameter to form clearance between itself and stem, keyways passing through tappet at two or more points removed from each other upon side contiguous to larger bore, gibs and keys by which smaller part of bore is caused to seat about stamp stem.

ART OF TREATING REBELLIOUS ORES OF THE PRECIOUS METALS.—No. 707,214.—W. F. Downs, Jersey City, N. J.

Process of treating ores containing precious metals and rebellious elements which consists in intimately mixing ore with sodium compound and agent capable of releasing metallic sodium therefrom, heating mixture to temperature sufficient to release sodium, whereby combination of sodium with rebellious elements of ore results and leaves precious metal distributed in free state throughout mass, permitting volatile impurities and compounds to escape and finally recovering precious metal from the mass.

Mining Summary.

Specialty compiled and reported for the
MINING AND SCIENTIFIC PRESS.

ALASKA.

(Special Correspondence).—Ground that was frozen last summer so that no work could be done on it is being worked easily this summer, and everybody is anticipating a result that will be almost double the gold output of last year, namely, at least \$10,000,000.

The vicinity of Nome has proven to be the most valuable one. The "Hot Air" bench on Glacier creek has produced during the twenty days of work up to date \$75,000. C. D. Lane has produced out of No. 2 below on Anvil creek up to date this season \$200,000, and corresponding amounts have been taken out of all the Anvil creek claims. The bench ground on the left limit of Anvil creek has proven to have an old channel, which is being opened up with almost the same results as the creek claims.

On Dexter creek several sales of property have been made to Kelly and the Pioneer M. Co. The Sugar claim has been sold for cash for \$50,000. The Bowery claim, Molasses, several claims on Newton gulch and Dry creek have been sold to the same parties at an aggregate figure of \$250,000. The purchasers have installed boring outfits on the Dexter claims and are prospecting for deep diggings.

The hydraulic ditch of the Miocene M. Co. is doing excellent work on Snow gulch, and a branch leading from Hohson creek is doing good work on No. 7 creek claim on Dexter. The ditch will be finished (about 25 miles in length) in the course of two weeks, when 2000 inches of water will be conveyed from Hohson to Dexter and Glacier creeks. The same company is putting a tunnel through the hill between Glacier and Anvil to use the water on Anvil creek.

C. D. Lane's pumping plant is in operation as far as Cooper's gulch, which property Lane intends to open up first. The pumping plant works like a watch, but the pipes occasionally cause some trouble. However, the defects will be remedied in time.

The Anvil Tundra M. Co. of Los Angeles, Cal., who bought property below Anvil creek, on the left limit, for \$100,000, is boring for prospects, to locate the channel, with good results.

Nome river benches, about one mile above Dexter, have been found to contain a large amount of low pay gravel, and a New York company is putting a ditch from Hohson (the mouth of Hohson, the Miocene Co. gets the water at a large spring at No. 3 above) creek to their claims.

There is another concern, the Gold Run M. Co., putting a ditch at the head of Nome river to work some bars on the left limit.

The Carson M. Co. has purchased some claims at the head of Snake river, also bar claims, which will be worked extensively.

The Solomon district has proven to be quite a surprise. The claims on Kasson creek, Discovery and No. 1 below, have opened up their claims and put a ditch 4 miles long from Shovel creek, and the first clean-up of ten hours they have paid for the mine and ditch. No. 2 above and the rest of the claims have no water. The formation is limestone and the pay is in the crevasses. Mystery creek is a surprise to everybody. Only two weeks ago, on No. 1 above, they have found a body of pay of 3 feet, which goes from 25 cents to 75 cents to the pan. They average about \$40 per shovel per day. The same can be said of Discovery, which was sold by former Collector of Port Ivey to some parties for \$3500, only two weeks ago, before the pay was struck. No. 1 below, which has produced \$10,000 last year, is working twenty men this summer, and the owners expect to take out \$40,000. Big Hurrah creek is working up to No. 6 above with very gratifying results. Mrs. C. D. Lane has opened up a quartz ledge on Big Hurrah, which is free milling and assays as high as \$1000 per ton. She intends to ship the ore to the outside this fall. Solomon river benches have been opened up to some extent; however, they are too deep to work at present. The Miocene M. Co. is surveying for a ditch in that part of the country, and it is bound to do good business. A claim on Murane gulch, tributary to Solomon, was sold a few days ago, it is reported, to the Kimhal M. Co. for \$16,000. The upper Solomon is working to some extent, with better than wage diggings. The Council City district has been known to be good for the last two years. Ophir creek is the banner creek in that country. C. D. Lane has a good many properties there, is putting a railroad from Council to his claims, and

works about 250 men. He brought down 380 pounds of gold about two weeks ago, and again 200 pounds last week.

The York district is being prospected for tin. On Buck creek they have found stream tin in pretty large quantities; however, it is doubtful if it will pay as yet to mine that metal. On the Onokowak river, just the other side of York, some Salt Lake parties are prospecting, digging 50-foot wide trenches, evidently looking for the tin ledge. They are very close-mouthed, and it cannot be learned if the stream tin is found in paying quantities.

The Bluestone district this year is very quiet. There seems to have been last year a boom in those claims, which was not warranted; only a very few claims are working with any results.

The Knugrock district is practically abandoned. Lane left the country in disgust. There does not seem to be any regular pay streak in that country, but only spot. It is said by very reliable men that they may find a pan of \$25 in one spot, but then hunt for two months, sink holes and crosscut the creek and get nothing else. Iron creek, which is also in the Kougrook district, is paying only wages.

The Casa de Pago district is fairly good. The best creek is Ruby creek, which will be nearly worked out after this season. Elkhorn is good and so is Melting.

Candle creek, of which so much was written and said last fall, is in many instances a disappointment. The pay streak is very thin and only at the surface. There are a few claims which will make some money. Sam Pepper is doing well on his six claims at the lower discovery. It is reported that he is taking out about \$1000 per day. Kjelberg, on No. 17 above, is reported making some money.

The latest strike of any size was made a few days ago on Peluk creek, about 2 miles east of Nome. They have found about 1 mile from the beach a deposit of gravel 17 feet in thickness and 600 feet wide, which goes from 10 cents to 75 cents to the pan. The Smook M. Co. claims the ground, and the parties working the claims have been enjoined from further workings.

The Northeast Siberia M. Co. is doing good work across the Straits, it is reported. More than 100 American miners have been grubstaked by that company, and the reports coming from that part of Siberia now are quite encouraging. They claim to have made good discovery about 2 miles from the beach. The country, however, is most inhospitable. Even the drift-wood, with which this side of the Straits was blessed during the first part of the "stampedee," is absent in that country. The company, however, that is operating under a concession of the Czar, is well organized and backed by big capital. Nome, Aug. 13.

Fourteen claims on Nevada creek, near Juneau, are bought by F. M. Stone, representing New York men—the Alaska Treasure, Thousand Fraction, Cora Butler, Champion, Belmont, Copper Stain, Island, Summit, Denver, Bonanza, Blue Bell, Last Chance and Utah lode claims, with water power and beach rights. The Juneau Dispatch says: "The ledge on the surface is fully 1200 feet wide, and it is one of the huge deposits of low-grade ore that has made Douglas Island so famous." Work will start this season on the property. The present showing made warrants the erection of a large stamp mill.

Work has been suspended on the new gold quartz mine operated by the Apollo M. Co. at Squaw Harbor. This ledge was discovered last year and was being developed by shaft and a 5-stamp mill. The money was furnished by L. Sloss & Co. of San Francisco, who operate the Apollo mines, which are yielding large returns in gold hullion.

At Valdez the Rainbow M. & D. Co., G. Barrack general manager, will do considerable preliminary work for a hydraulic plant to be put in operation there. A tunnel will be cut and a tramway huilt from the beach. It is expected that they will have 100 men at work Sept. 1.

At Sea Level, southeastern Alaska, the Sea Level M. & M. Co.'s new mill and other improvements, costing \$61,000, are in operation. The vanners are not sufficient to handle the ore if the mill were run to its full capacity of 125 tons a day. The power drills are too large, as they drill holes of such size that in blasting the ore body, as well as additional rock of no value, is thrown out and has to be treated at the mill. These minor objections will be remedied at once.

Juneau expects that the great tunnel to be run from the beach on Gastineau channel to the Silver Bow basin will begin next month. The tunnel will be 12,000 feet long and will be at least eighteen months in building. The company that will construct the tunnel has contracts with the Alaska-Juneau and Alaska Perseverance companies to carry the ore mined in the basin to the beach, where

the mills are to be located, for 8 cents per ton. Juneau figures that the ore may run \$4 per ton and can be milled for \$1.25 per ton, and that the mines in the Silver Bow basin will be able to run winter and summer as soon as the tunnel is finished, hundreds of miners who are in the habit of returning to the States every fall remaining for steady employment.

ARIZONA.

COCHISE COUNTY.

The Buena Vista mine directors are considering the advisability of erecting a smelter on the Southern Pacific Railroad, 4 miles from the mine, and putting in a railroad or tramway from the smelter to the mine.

The Calumet & Pittsburgh Development Co. at Bisbee will buy the Del Oro and bond the Ormond group of five claims close to the property of the company. The Briggs shaft is now down 410 feet.

The Copper Bullion M. Co. have the tunnel in 900 feet—200 feet yet to run to cut the main vein at a depth of 400 feet.

MARICOPA COUNTY.

At Phoenix the Big Creek G. M. Co. has incorporated; H. L. Hollister, W. M. Lucas, F. C. Rutan and others of Idaho. The Huh M. & M. Co., W. E. Galpin, J. B. Flynn, P. G. Lowenberg of Iowa, and the Norwegian Con. M. Co., E. A. Bridgeford, B. G. White, J. M. Vignia of California, are incorporated at Phoenix.

Manager F. M. Czarnowski of the Leviathan G. M. Co. says it is reported that the building of the proposed railroad west from Congress Junction will soon begin; that the Planet Saturn mine in Fool's gulch, together with a number of adjoining claims, is sold to New York parties for a sum in the neighborhood of \$435,000. The Planet Saturn is a developed property and one shaft is down 1120 feet and all in ore. There is also some drifting on a ledge that shows a pay streak of 4 feet.

The mine is about 5 miles east of Congress Junction, with a 10-stamp mill on the ground. It has not been worked on Planet ore lately, for the reason that a larger plant is necessary to work the property to the best advantage, and the new owners expect to build a 100-stamp mill as soon as possible. Three miles farther, 1 mile from Stanton, is the Trinidad—Genung or Churchill—mine, at one time bonded by the Leviathan Co., but released for the reason that it found plenty to do in the development of its other holdings. The Trinidad is showing up well. It is the intention of the owners to put up an 80-stamp mill, which was decided upon after a thorough test made at the Planet Saturn mill. It was intended to make a mill run of 1000 tons at the Planet Saturn, but after 200 tons had been worked the expert was satisfied without going to further expense. The Octave mine and mill are running full forces and with good results. On the Leviathan property, which Manager Czarnowski is developing, the incline shaft is now down 250 feet.

MOHAVE COUNTY.

O. W. Barnes and A. B. Robbins of the Cyclopic mine, Gold basin, are putting in machinery and will install an automatic cyanide system at the property. The mine is now so far developed that it will keep a good-sized plant in ore.

The Kingman Miner says the strike in the Minnesota-Connor mine is in fine shape. The ore bodies are getting larger as the drifts are being driven. One hundred tons will be tried out at the smelters to ascertain the feasibility of smelting in connection with the concentration plant. If the concentrates have to be handled they will be briquetted and a machine for that purpose will be put in.

The Kingman Miner reports a body of silver ore on the 300-foot level of the C. O. D. mine, 630 feet west from the shaft, of an average value of 680 ounces silver and \$16 gold.

PIMA COUNTY.

Eight miles from Vail a strike is reported in the Cuprite mine in a crosscut from the 150-foot level. The rock carries a percentage of copper, and is said to average \$41 in gold.

PINAL COUNTY.

The Copper Hill M. Co., 3½ miles from Oracle, on the west side of Canada del Oro, are grading for a leaching plant with a daily capacity of 100 tons. On the 200-foot level they have a body of 5% ore 17 feet in width. The ore is carbonates and copper silicates. They are surveying a line from the mines to Red Rock station, on the Southern Pacific Railroad, via Squaw Tanks. The plant will be in operation January 1.

D. F. Platner, manager Home T. S. M. Co., Picacho mining district, has five claims, prevailing values copper. He will arrange for a smelting plant; pending this, development work will be pursued.

YAVAPAI COUNTY.

Near Jerome, at the United Verde, carbonic oxide gas is made and forced where the fire is confined. After it is extinguished work is projected on a larger scale than before. The smelter has six 250-ton furnaces, four of which were kept at work. No. 1 has been torn out to make room for a 500-ton furnace, which is to be followed by another of the same size. This will make necessary additional converters, etc.

The Iron Queen smelter is building at Mayer and the railroad is being extended beyond Mayer toward the Crown King mine. Twelve miles south of Mayer is the French Lily mine, where three shifts are pushing development work. Two miles farther, at the Middleton mine, three eight-horse teams are hauling air compressors, drills and other machinery, to be ready for work January 1, 1903. Leyster Brns. are operating a steam dredger. All the water is piped from the top of a neighboring mountain. The dredger, instead of floating, is placed on wheels. Its capacity is 600 yards per day, but they only have water for 200. The dirt pays from 10 cents to \$3 per yard. The Iron King mine, 8 miles north of Mayer and 1½ mile from the Val Verde smelter, is owned by the American Copper Co., B. Blanchard superintendent. Two shafts are down 117 feet. Two more shafts are down 60 feet each, and on the 100-foot level there is about 1400 feet of drifts and crosscuts. The Bonanza mill on Big Bug creek, near Mayer, is working day and night shifts. About \$9000 was the result of last month's run.

Superintendent Smith of the Jerome Canyon C. Co. has the main shaft down 140 feet. He will put in a pumping plant in Mint valley to pump water over the hill to the mine. Near by the Little Giant Co. is sinking two double-compartment shafts. The ores carry copper, silver and gold.

The Jerome Mining News interviewed W. A. Clark and quotes him as follows: "The mine and works will be started up, depending on the time it takes to put out the fire in the mine. The fire is burning from the 500 to the 150 foot level and from 200 to 300 feet in depth. It has been hulk-headed in and they are forcing gas upon it from two generators. To completely extinguish the fire, it will be necessary to entirely cover it with this gas. After doing this work the gas will be taken from the mine through the 500 foot tunnel, when work can be again carried on. The condition of the copper market is such that they are in no hurry about starting up at present. There was an increased production of 25,000,000 pounds for the first six months of 1902 over the last six months of 1901. This immense production of copper will naturally create a surplus, and this surplus would force the red metal down to 10 cents, and there are but one or two mines that can afford to produce copper at 10 cents per pound, and Montana does not contain one of these."

The office of the Val Verde Copper Co. has been removed from New York to Prescott. F. M. Murphy has taken the presidency of the company. Board of Directors: F. M. Murphy, M. Goldwater, T. B. Hawkins, C. G. Fennell, J. L. Davis, S. E. Bretherton and W. F. Taylor.

YUMA COUNTY.

The Planet group of copper mines are sold to Boston men.

CALIFORNIA.

ALPINE COUNTY.

The Curtz-Evans mill on the Carson river at Loope is to have an aerial tramway from the mine to the mill. The dam and flume are finished and ready for the turbine wheel to furnish power. The mill will crush 100 tons daily.

AMADOR COUNTY.

At North Clinton the Edinburg G. M. Co. are sinking a double-compartment shaft to the 300 level. Assays from clear across the ledge in the last crosscut gave \$14.81 free gold, 88 cents in silver, with 3.6% sulphurets, value \$54 per ton.

At the Defender Manager Joyce is putting up a new hoist and 10-stamp mill.

In the Del Monte mine the tunnel has tapped the Riverside ledge; the ore body is 26 inches wide. The water supply having failed, hand drilling is resumed.

The ledge has been found in the 850-foot level of the Fremont shaft and the rock is reported as good as it was on the level above.

CALAVERAS COUNTY.

At the Golden Eagle quartz mine at Siheria, near Jenny Lind, Supt. G. B. Tolman has the grading completed for a new plant. The shaft connects with the old workings of the mine.

At the Altaville mine, near Angels, cross-cutting and drifting from the 400 level is in progress.

At the Melones mine four cars are used

to haul the ore 1 mile to the ore bin and rock breakers. Sixty stamps are in operation.

D. A. and W. M. Nuner have bonded their mine on Central hill to Oakland men for \$60,000, first payment to be made in October.

FRESNO COUNTY.

A quartz mining property, about 1½ mile west of Dunlap, has been bonded by J. McKiernan of San Francisco for \$50,000, the option good for one year. In the meantime the lessee is to pay \$20 per day for each 3-stamp mill he operates; he intends to put up one and a Huntington mill of 1½-stamp capacity, hence will pay the owners \$30 per day.

INYO COUNTY.

O. H. Hill and M. C. Hall have a molybdenum claim at South Bishop lake; the ledge, 100 feet wide, is estimated to carry 40%.

W. C. Pidge has fourteen men at work on the Leidy-Vanfleet mines, near Bishop. The Yaney-Enloe mines are being worked by C. T. Hohensthal.

KERN COUNTY.

Talking of the Yellow Aster, the Randsburg Miner says the temporary bucket is now in at the Goler wells and the 100-stamp mill is running. When the shaft is retimbered, connection of the new well with the old one, a distance of 270 feet, by a tunnel run below the water level, will be done.

LASSEN COUNTY.

The Lassen M. Co. has incorporated; A. M. Hunt, M. Meredith, E. H. Benjamin, L. Sloss, L. Sloss, Jr.

MARIPOSA COUNTY.

At the Hite mine the compressor is in operation unwatering the shaft. H. J. Sisty, the superintendent, is in San Francisco.—A shaft is being sunk at the Early mine, on Sweetwater. The new company expects to put in machinery.

Nevils & Hanna are operating the Dolph mine at Whitlock.

NEVADA COUNTY.

The South Yuba M. & D. Co. has incorporated; the mine is located near Maybert; C. I. Swift, H. A. Niemeyer, M. S. Blanchard, J. A. Jeffrey, C. W. Porterfield.

C. H. Brockington, superintendent Orleans Con. mines, is running a crosscut to strike the Houston Hill ledge at 500 feet and has struck it. The 700-foot level of the Houston Hill has been reached; the upraise is being pushed forward; the crosscut opens up virgin ground which will have 200 feet of backs when blocked out.

At Grass Valley the plant at the Conlin mine, which was destroyed by fire last week, will be replaced.

G. W. Root has formed an Eastern company that has bonded the Charranot mine at Canada Hill and the Slate Ledge mine below Grass Valley.

W. F. Englebright and F. Zeitler are at Bear Valley, where they have a promising mining property.

Work has been resumed in the old St. Louis mine on Canada Hill.

At the Independence mine above Nevada City more men are to be put on.

PLACER COUNTY.

Near Forest Hill J. Beach has a 6-foot ledge which assays unusually high in gold.

PLUMAS COUNTY.

The Elizabeth G. M. Co. has incorporated; C. R. Thompson, L. T. Jacks, J. M. and W. D. Duke, and F. P. Howard.

The Quincy M. & W. Co. has cleaned up and is now arranging for next season's run. The Little Hope quartz claim, near Merrimac, is reported sold to parties who will operate on a large scale. The Lost Channel M. Co. has resumed work on the property near Cromberg.

W. L. Harper and G. Cooksey will erect a smelter at Taylorsville for Genesee valley ores.

SAN BERNARDINO COUNTY.

In the future Manvel, Cal., will be known as Barnwell.

SAN DIEGO COUNTY.

F. N. Ramsey, a mining man from Texas, has a concession from the Mexican Government to mine for gold ore on the largest of the Coronado islands, and to prospect the other islands for three months.

SHASTA COUNTY.

Local reports are to the effect that the Tarbet syndicate owns the Afterthought copper and gold mine, having paid about \$100,000, and that of the amount paid for the property Mr. Enright gets \$80,000 and the heirs \$20,000. The property comprises eighty acres.

The Sam Houston M. Co. has levied an assessment of 2 cents per share, delinquent September 27.

The Redding Free Press says that Saeltzer, Kahny, Jaegel and Arps have

given to F. H. Hall, who has the Arps group bonded for \$80,000, an extension of six months from December 10, 1902, the date of expiration. Mr. Hall, in view of the concession, makes a payment of \$5000.

Copley reports a strike in the lower tunnel of the Great Western G. Co.'s mine, 300 feet in. The shoot is 100 feet long and shows free gold its full length.

SISKIYOU COUNTY.

M. M. Hough has sold to R. Phillips several mining claims and ditches at Scott river, the Quartz Hill, Ryan and California mines, including the ditch from Mill creek to Hooper hill, the ditch to Poorman's Bar; also the Ryan, Tom Smith, Ed Reynolds, Jeffer, or new ditch, and the Hicks ditch, together with all the giants, pipes and other apparatus for \$100,000. This property will be worked on a more extensive scale.

J. P. Wood has sued J. A. Thompson for an eighth interest in the King Solomon's mines, which are owned by the defendant and valued at \$35,000. Wood alleges that Thompson made an agreement to transfer that interest to him.

TEHAMA COUNTY.

J. J. Grossman says that Cottonwood creek is to be worked by dredgers. His company has 9 miles of the bed of Cottonwood creek from 2 miles south of Cottonwood to 7 miles north. A drill costing \$3000 will prospect to bedrock, and if the ground is rich enough a gold dredger will be erected.

TRINITY COUNTY.

N. Thomas has made a strike on Packer's gulch, 6 miles from the Nash mine, 10 inches of ore assaying \$100 and 3 feet which goes \$25.

The Gold Hill M. Co. of Canton, Ohio, is opening up an ore body 10 miles east of Trinity Center.

The Cleary, Payne & Keenan Co. have put in a dredger on Trinity river, half a mile above Trinity Center.

The Oro Fino mine, owned by Strode Bros., near Carrville, is being operated. The mine is paying handsomely. G. Strode has charge of the mine, J. Strode superintends the 5-stamp mill.

At Trinity Center the Sikes M. Co., operating the Bloss & McClary hydraulic mine, have closed down and are preparing for the coming season.

At the Fairview mine eighty men are now employed.

TUOLUMNE COUNTY.

Near Groveland, the vertical shaft on the Cosmopolite is down 120 feet; sinking is in progress.

H. J. Dykes has a bond on the Oakland and Auburn mines above Yankee Hill. A 5-stamp mill will be overhauled and a new concentrator put in. A hoist will be erected and sinking continued.

The Imperial M. Co. has levied an assessment of .6 of a cent per share, delinquent September 29.

The old Buchanan may start up again. The Spring Gulch mine has resumed. The Western Venture M. Co. have it now. New machinery is being put on the Hard-tack.

The Spring Gulch mine shaft is to be retimbered 500 feet and sunk farther.

The cyanide plant of the Confidence M. Co. at Confidence is daily treating 100 tons of tailings.

The mill at the Golden West mine is in operation; F. Miller superintendent.

YUBA COUNTY.

The Marysville Democrat says there is little if any hydraulic mining on the watershed of the Yuba river at present, as the water in that stream is almost as clear as that in the city tank.

The Pennsylvania mill was started on the 22nd and the stamps are crushing ore from the 700-foot level.

The U. S. has paid \$875, one-half the amount of the purchase price of the land of Burns and Townsend, at the site of the proposed barriers at Daguerre Point. The only deeds now remaining to be paid are those of the Excelsior W. & M. Co. and the Marysville T. & Q. M. Co.

At the Miller quartz mine at New York Flat, 4 miles from Brownsville, a steam rock crusher is at work. This mine has a 10-stamp mill and is producing quite satisfactorily. The property is owned by Minneapolis men.

COLORADO.

ARAPAHOE COUNTY.

The New River Copper Co. of New York has been incorporated at Denver, authorized to carry on mining and milling of ores and metals.

BOULDER COUNTY.

A company has been organized to operate the Ramsey, the Kittie and the Eclipse groups of mines at Eldora. It is proposed for the economical mining of these ores to drive a tunnel 6000 feet long from 75 feet above Boulder creek in Main Boulder canyon, cutting the veins on each of the

company's claims and on all claims under royalty at a depth of from 600 to 900 feet, furnish drainage and avoid the necessity of hoisting ores from deep mines and transporting them by wagon over rough mountain roads.

CLEAR CREEK COUNTY.

The shaft on the Black Eagle is 560 feet deep. The company operating the mine have the entire Parker placer, including the Chicago mine, and the shaft is located near a junction with that lead. At the present time ore is being taken from the fifth level, although stopes have been started in all the levels. At the junction the vein is 16 feet wide, and the entire vein is bailed and treated at the company's cyanide mill on Chicago creek. Mr. Ames, the manager, tells the Idaho Springs Gazette that he does not sort any of the high-grade ore for the smelters, as he can treat it himself at the mill and make a saving over the smelting charges. The concentrates, however, are still shipped to the smelter as heretofore. They will run one to one and one-half ounce gold, seventy to eighty ounces silver, 12% lead, 8% zinc and 20% to 30% silica. The ore concentrates about twenty into one. He says the average percentage of saving with his cyanide process is between 85% and 90%.

Near Empire, on the Conqueror group, Silver mountain, an ore body 9 feet in width was opened up on the Conqueror vein.

The Empire tunnel is in 1220 feet and advancing at a rate of 5 feet per day, being driven with two power drills.

A strike is reported on the Milford lease on the Salisbury mine of the Stanley Consolidated at Idaho Springs.

The frequent occurrence of quartz feeders, thickly interspersed with copper and iron pyrites, and the exceeding hardness of the rock is regarded by the management of the Empire Tunnel Co. as evidence of the proximity of another vein. The bore has passed the 1200-foot mark.

CUSTER COUNTY.

The Bassick mine will enlarge its mill from a capacity of seventy-five tons per day to 100 tons. Rollers and crushers go in at the new deep shaft, where the ore is delivered and crushed and is then conveyed in sluice boxes to the mill, 500 miles distant, this method of transmitting ore being thus used for the first time in that part of the State.

The new 10-stamp mill at the North Star mine, 9 miles from Custer, is in operation. The North Star Co. says there are ten stamps with room for twenty and power enough to run forty.

DOLORES COUNTY.

Manager Rider of the United Rico Mines Co., at Rico, is having the Atlantic Cable mill placed in condition to operate.

FREMONT COUNTY.

At Florence the Hillside Reduction Co., to operate in Fremont and Custer counties, has been formed; object, to reduce gold and silver ore, buy and sell metal bullion.

GILPIN COUNTY.

During the second week of August the shipments of smelting and crude ores, tailings and concentrates from the Black Hawk depot to the Valley smelters and outside points of treatment were 107 cars, or 2040 tons, making a total of 217 cars, or 4240 tons, for the first half of August.

GUNNISON COUNTY.

The Akron tunnel, White Pine district, is working three shifts. Superintendent Harper has the 3300-foot bore well into the hill and expects to get into the mineral zone of the May-Mazeppa and North Star properties.

J. A. Mann, superintendent of the Horton G. M. Co., is working the property above Tomichi. They have ore that runs \$64 in gold and copper.

HINSDALE COUNTY.

At Sherman, 3 miles east of the entrance to Burrows park, the large dam blocking the waters of the Lake Fork river will be completed next month. The Tabasco's power transmission line along and through which the power will be carried to the mill and the mine is 7 miles and 9 miles from the power house. The mill is being built on the company's millsite at the head of Burrows park, and where the Hinsdale-San Juan road begins its real ascent is over the divide between the Lake Fork and Animas rivers. The process will be concentration and cyanide, capacity 150 tons daily. Between the mill and the mine the Leschen Co. of St. Louis is stringing the tramway. O. W. Pierce is resident manager.

IRON COUNTY.

Manager Frew of the Iron Mountain Copper Co. says work will be resumed, the shaft sunk to the 400-foot level and other developments started.

LAKE COUNTY.

At Twin Lakes the Golden Gate and Golden Bay claims will be worked by J. J. Smith of Leadville.

At Leadville the water has been lowered in the El Paso shaft to within 65 feet of the bottom. Manager Newell thinks that by Oct. 1 the property will be all unwatered and shipping ore.

Another shaft is being sunk on the Cora Bancock ground, and this will be down as deep as the El Paso shaft by Oct. 1. A set of pumps will also be put into this shaft, and it and the El Paso Maid will be the company's main shafts, the intention being to sink them both together as soon as the water is taken out, and continue sinking until the second contact is reached.

Wm. Bowden has bought the Ruby Leasing Co.'s ground and will tunnel 400 feet to connect with the Yak tunnel.

Leadville reports that after having installed a large plant, and being in a position to handle 500 tons of ore per day, the Greenback mine has turned off steam, shut down its pumps, and will close the mine indefinitely, caused by the inability of the management to make a contract with the American Smelting & Refining Co. The mine employed thirty men. The ore is a sulphide, and like all sulphide bodies there are high and low grades. Manager Mulrooney states that the smelter has been taking the high grade material and charging the highest rate the traffic would bear. The company desired a contract under which they could ship the material, the same as other mines in the camp, but were unable to obtain it. This led to the closing of the property.

There is a resumption of work on the Rialto property, in the hands of the Small Hopes M. Co., in charge of S. W. Mudd.

PITKIN COUNTY.

At Aspen, F. Meyer, W. P. Nelson and E. Stallard have incorporated the North Pole M. Co.

PUEBLO COUNTY.

At Pueblo the new zinc smelter in the eastern part of the city will be completed January 1. The plant will be a large one and will employ 500 men when in working order.

SAN JUAN COUNTY.

At Eureka the Tom Moore Con. M. Co. has a body of copper sulphide ore in the No. 1 tunnel, 1600 feet from the mouth. The Tom Moore has been a large shipper from the surface workings to the smelter at Silverton, 9 miles away.

Silverton reports in the Gold King mine, since the new strike of gold in the American tunnel, that an occasional special run is made over the Cement creek branch of railroad with guarded car. W. Z. Kinney, superintendent Gold King Con. M. Co., says his company intends to construct buildings adjoining its properties near Gladstone for miners and families.

Bear Creek's experimental mill for the treatment of tellurium ores has treated ore from two of the larger properties.

The Kendrick-Gelder smelter is handling about the same quantity of crude ore and concentrates shipped to outside smelters as last year at this time.

The Esmeralda mine, near Silverton, is daily producing four D. & R. G. cars of \$40 ore.

SAN MIGUEL COUNTY.

The Mayflower G. M. Co. is incorporated at Telluride; E. L. Davis, W. A. Nicodemus of Telluride, John Eckman of Calumet, Mich.; principal office at Telluride.

Telluride reports that the H. M. H. group of claims, consisting of three patented mining claims, the H. M. H. No. 1, H. M. H. No. 2 and the Jennie lode, located in Bear Creek basin, are sold to John Akman, representing Calumet, Mich., people, for \$25,000. The new company is the Calumet-Telluride G. M. Co., Calumet, Mich. The ore is carbonate, strictly a concentration proposition, and the values are gold. The veins range in width from 3 feet to 5 feet and the average value is about \$10 gold per ton. The company has bought the Glencoe mill on Bear creek, below the properties, and will construct a tramway 3400 feet in length to connect the mine and mill next spring. The equipment of the mill will be greatly enlarged. There is plenty of water for batteries and concentrators for a large mill.

Telluride reports that the owners of the Silver Pick group of mines, including the Silver Pick mill and two placer claims, have mortgaged their possessions for \$100,000, presumably to inaugurate operations on the property. The properties are on Mount Wilson, a shipping station on the Rio Grande Southern Railroad.

Seventy pounds of gold ore—\$1800—is asserted to be the result of a cleanup of some ore out of the Governor mine, near Telluride, recently.

The Mayflower G. M. Co. has incorporated. J. Eckman, general manager, is to

handle the Mayflower group, Grey's basin, a fork of the Bridal Veil, 5 miles south-east of Telluride.

TELLER COUNTY.

On the 19th 140 tons of good grade ore went out from the Isabella company's territory on Bull hill. Of this amount 75 tons were shipped by the company and 65 tons by lessees. The ore will average from \$30 to \$50 in gold to the ton.

The Golden Cycle Co. has in the sixth level cut the La Belle vein at a point 100 feet beyond the Revenue Cutter vein, showing between 3 and 4 feet of good ore.

Cripple Creek mine managers who have orders placed for machinery are pleased over the reduction in freights from Chicago and seaboard points, as it will save them thousands of dollars in freight charges. Heretofore the freight charges on machinery from seaboard points to Colorado Springs has been \$1.10 per 100 pounds. The reduction cuts it down to 66 cents. From Chicago points it has been 80 cents per 100 pounds, and that has been cut to 49 cents.

Cripple Creek reports a strike at the El Paso Gold King mine, Poverty gulch. A 12-foot ore body is opened at the bottom of a winze which is being sunk in the 800-foot level. A shot was put in to what appeared to be a hanging wall and when the smoke cleared away some of the finest gold ore ever seen in the district was found. Assays taken across the entire face of the vein average \$40 per ton.

The United Gold Mines Co. is making the third largest production in the Cripple Creek district, the Portland first with 300 tons, the Stratton's Independence second with 250 tons, and the United Gold mines with 135 tons of high-grade ore a day.

IDAHO.

ADA COUNTY.

Control of the Gold Eagle group, Boise, has been acquired by Dorn & Alris of the Con. Mercur, Utah. With four stamps the mine has since January pounded out gold to the value of \$25,000. J. T. Donohue, former superintendent of the Mammoth Co.'s mines at Tintic, will remain with the Gold Eagle in similar capacity. He is extending the drifts in each direction on the 200-foot level in ore, dropping on down to the 300 with the shaft.

BLAINE COUNTY.

E. E. Rogers, of the Gold Creek Con. M. Co. of New Jersey, has returned to Portland, Or., from Pierce City, Idaho. Mr. Rogers was recently appointed a delegate to the mining congress, which convenes at Butte on September 1. Mr. Rogers will represent Idaho at the congress and received his appointment from Governor Hunt.

"I have just completed the arrangements for the machinery for the Blaine group of claims on Moscow mountain for the Gold Creek Co.," said Mr. Rogers recently. "I bought \$2000 worth of equipment in Spokane and will have it installed immediately. It is a cyaniding proposition. We will have the tanks and an entire reducing plant on the ground and will put a large force of men at work. The mine was bought a few years ago from D. Russel Morris, a mining man of Butte, Mont. We now have a double compartment shaft down 42 feet. Our vein is low grade, but is 30 feet wide, and we have all kinds of ore in sight. The mill we expect to put in will drop twenty stamps. I bought the Five Point group of claims at Hailey, the property formerly owned by J. Fleming, for \$30,000 and a silver, lead, gold and copper proposition which will require a smelter." He will arrange for a \$60,000 plant. An electric plant will be installed at a cost of \$12,000.

IDAHO COUNTY.

(Special Correspondence).—The Fall Creek Placer M. Co. has 220 acres of placer gravel ground that will average 43 cents per yard. The company has just commenced working and will make a clean-up this fall. The ground is 15 miles from the old Florence placer diggings, which was worked in the early days. There are several successful placer mines being worked in the surrounding country. It looks as if placer mining by dredger process is going ahead. There are thousands of acres of gravel land that can be worked with profit, if capital will investigate and go at it on right lines.

Florence, Aug. 25.

LEMHI COUNTY.

The Lemhi Herald, of the nickel deposits there, says the large veins of nickel-bearing ores found in the Blackbird and Yellow Jacket districts are attracting attention. Commencing with the outcrop of basic rocks in Yellow Jacket creek, the nickel-bearing zone, coextensive with the granite formation, includes Musgrove, Copper, Blackbird, Clear, Big Deer, Little Deer and Beaver creeks. In Yellow Jacket the ore also carries gold, silver, copper, iron, cobalt and bismuth. In

Blackbird the nickel is found combined with iron or copper in a sulphide.

OWYHEE COUNTY.

R. H. Britt, general manager Poorman mine, Silver City, says rich finds are being made in the old workings. The Poorman's recent rich strikes, he says, are not overestimated.

SHOSHONE COUNTY.

At Burke the Trade Dollar tunnel is being run as a crosscut to tap the ledge. The officials say the ledge will be reached Jan. 1.

At Wardner the ore of the Bunker Hill & Sullivan mine will be taken through the long tunnel to the mill, instead of taking it up over the hill by the aerial tramway. The output of the mine will be increased, more men added and more machinery set in operation. The new tunnel from the mill, west of Kellogg, to the mine at Wardner, is in 12,000 feet. Electric cars have been installed, and, as fast as the ore and rock are taken out, they are taken to the mouth of the tunnel by motor power. The improvements have cost over \$50,000. At present about 1200 tons are taken from the mine per day, but, when the new system is in working order, that output will be increased.

MONTANA.

BEAVERHEAD COUNTY.

P. I. Smith of the Crystal Graphite Co., Axe canyon, Dillon, says development work has suspended for the season, having reached a point where it will be necessary to put in a mill. Unlike ordinary concentrates, the graphite floats off over the water and must be saved by means of washing over a fine screen.

DEER LODGE COUNTY.

A. Schröller and V. Page say they have a 7-foot vein of gold ore on the Lucky Boy claim, near Danielsville. The Lucky Boy adjoins the property of the Dorothy Co. on the west.

FERGUS COUNTY.

Quartz property in the new cyanide district, at the head of Sage and Willow creeks, is being developed. C. M. Goodell says the ore is similar to the Kendall ore; the best is found in the vicinity of the big lime reefs which traverse the country for several miles; the surface covering is either sand, rock or shale.

In North Moccasin the King-Barnes Co. is crushing 225 tons of ore per day and is planning for the enlargement of its mill.

At Kendall the 350-ton cyanide mill of the Kendall Co. is in operation. Superintendent Lang has the new shaft down 280 feet.

FLATHEAD COUNTY.

(Special Correspondence).—An electric drill is in operation on the property of the American Kootenai M. & M. Co., the first electric drill plant installed in Flathead county. The company, with its water power, gravity tram and electric light and drill plant, is in a position to mine and mill cheaply.

The Great Mother Lode property is being developed, and a 65-foot tunnel, which has just been driven, opens up a ledge of free gold ore.

Sufficient ore is blocked out to keep a 40-stamp mill running, and it is proposed to erect the mill this season.

Cabinet, Aug. 24.

A strike of rich ore in the Mollie Gibson mine, owned by the Mollie Gibson M. Co., is reported—galena, pyrites and peacock copper.

GRANITE COUNTY.

The Good Hope M. Co. contemplates erection of a steam hoist on the Silver Chief claim at Tower, and will sink a shaft to explore the contact.

The Dorothy of Montana M. Co. is incorporated. Its mines are near Granite. D. M. Durfee of Phillipsburg is the company's Montana agent.

LEWIS AND CLARKE COUNTY.

Mason, Meade & Harschberger, constructing the 60-stamp mill on the Big Indian mine, in the gold belt south of Helena, have incorporated under the name of the Big Indian M. Co.

Thomas Cruse has unwatered the Kennedy mine and sinking the shaft from the present depth of 200 feet to the 300-foot level has begun, on Jackson creek, 8 miles southeast of Helena. Eight inches of ore is shown in the bottom of the shaft.

The Piegan mine, near Gloster, above Marysville, is being unwatered preparatory to resumption of work.

MADISON COUNTY.

The Bismarck & Nugget Gulch Con. M. Co. is pushing work at the Toledo properties near Sheridan, and will put in a pumping plant at the new shaft. The mill at Nugget is steadily running; Superintendent Ring.

MISSOULA COUNTY.

At the Monitor mine, on the line of Montana and Idaho, thirty men are at work. They are developing the ground

in the interest of Minnesota men, who have the property under a bond of \$150,000. The shaft has reached a depth of 200 feet.

Five stamps of the mill of the Oro-Monarch M. Co., operating near DeBorgia, are unattached on ore from the company's mines, and the other five will be in place in a short time. The ore is low grade. If the 10-stamp mill saves the gold the mill will be enlarged. Assays of picked rock have given returns as high as \$125 per ton, but the average value of the ore is about \$10.

SILVER BOW COUNTY.

At Butte, on the 22d, the reverberatory building of the Butte Reduction Works, owned by Senator William A. Clark, was totally destroyed by fire. Loss \$30,000, insurance \$15,000. The loss will necessitate temporary closing of the smelter and of the mines which supplied it with ore.

NEVADA.

ELKO COUNTY.

A mass of 1700 tons of \$5 ore is said to have been broken down by a single blast in the Dexter mine at Tuscarora recently by piling a large amount of giant powder in a narrow drift run for that purpose. The Tribune hears that the sale of the Dexter Co.'s mines and mills is being again promoted.

ESMERALDA COUNTY.

J. G. Court, discoverer of the New Klondike mines, says the property is under bond to a Philadelphia company, which has men at work developing.

EUREKA COUNTY.

Ore shipments by rail from the mines of Eureka and Hamilton district for the week ending August 22 were as follows: Eureka Co., 26,260 pounds; Rocco-Homestake, 51,200 pounds.

The Hamburg mine, southeast of the Diamond and Excelsior mines on Prospect mountain, Eureka district, has been leased for two years by Stinson & Co.

HUMBOLDT COUNTY.

The Sunlight M. & S. Co. has been organized to operate in the northern part of the county.

The Sunlight M. & S. Co. is incorporated at Winnemucca.

LINCOLN COUNTY.

The Hillside and Bristol mining companies, operating in the Pioche section, jointly own a 200-ton smelter. The plant, it is said, will be run by a management separate from the companies owning it, as in addition to treating ores from the Bristol and Hillside mines, it will do custom work.

T. M. Bard and W. Caltes are developing their property in Kingston mountain, an iron dike 150 feet wide, which runs 75% iron and \$12 gold. The property is 25 miles southwest from Sandy.

The Green Monster will resume work September 1st at Yellow Pine. This mine is owned by the Hearst estate and managed by F. P. Wilkinson. A double compartment shaft will be sunk.

NYE COUNTY.

Besides Weepah another camp has been struck in the Tonopah region. It is 20 miles southeast and is known as Henapaw. The ledge is good sized and carries values in silver as high as 500 ounces.

The Pactolus group of mining claims, near Tonopah, are reported bonded for \$125,000.

At Tybo, the Tybo M. & R. Co. has twenty-five men doing development work on its property.

The Mountain Tonopah M. Co. has incorporated at Salt Lake, Utah; C. E. Knox, president, A. C. Ellis, Jr., vice-president, and A. G. Cushman, secretary and treasurer. The property of the company consists of eleven claims, 160 acres, on the north and adjoining the north side line of the Mizpah ledge. The company has purchased the equipments employed on the O'Meara Lynch lease and will rush development work.

T. L. Oddie and F. J. Slebert of Tonopah have bought the Yankee Blade group, 4 miles from Austin, and will put hoisting and pumping machinery on and begin systematic development.

STOREY COUNTY.

The drill boring down into the east wall of the Comstock lode from the surface, to prospect for an ore body about the 900-foot level, is making rapid progress, the new hole being down about 300 feet without fitching. At the depth of 190 feet the casing was inserted and the hole reduced from 7 to 6 inches in diameter. Electric power is brought to bear in the work, three shifts of men employed, and 100 feet per week is expected to be accomplished.

In connection with an article on page 115, it is expected that the Reider electric pump will get into operation on the 2150 level of the C. & C. shaft of the Con. Virginia M. Co. about Oct. 14, to pump the

water down to the 2500 level or bottom of the shaft. The electric hoist of the shaft is already in position, as described and illustrated, and will then be started into full operation.

At Virginia, drill hole No. 2, on the Brunswick lode, is down 340 feet, and still in porphyry.

The Savage mine reports from the Gould & Curry tunnel, 425 level: In the up-ramp from the north drift from No. 2 east crosscut, we have been occupied during the week in opening one set to the east and two sets to the south, on the tenth floor. Saved fourteen cars of low-grade ore, which has been sent to the Best & Belcher mill. The car sample of this ore averaged \$8 per ton.

WASHOE COUNTY.

C. B. Bell has a working bond on the Crown Point mine, Olinghouse canyon, to leave all ore on the dump, unless he pays \$5000 in six months, final payment of \$5000 in nine months.

WHITE PINE COUNTY.

In the Chalmers, at Ely, in the ores furnished the mill an average for the mine of \$3 a ton is estimated.

C. Wah has shipped to Salt Lake a lot of ore from Cherry Creek that carries 7.18 ounces gold, 7.5 ounces silver, 3% lead and an iron excess of 30%.

NEW MEXICO.

BERNALILLO COUNTY.

T. Curran of the Jura-Trias Copper Co. is at the mines of the company at Senorito to take preliminary measures looking to the installation of a 100 ton plant. The 25-ton smelter installed last year has proven inadequate. The company is locally credited with intention to spend \$1,000,000.

DONA ANA COUNTY.

The Organ Gold Co. say they have thirty claims, in every one of which the ore shows gold, silver and copper in paying quantities, and that they will do considerable work and need machinery.

LINCOLN COUNTY.

J. M. Rice, manager of Eagle M. & I. Co. at Nogal, says he has completed the purchase of the Old Abe mine at White Oaks for his company.

SANTA FE COUNTY.

The Lazarus G. M. Co., thirteen mining claims, with all the personal property, will be sold by W. Swyers, receiver, to satisfy the liens, which aggregate about \$5000.

SIERRA COUNTY.

In the mining camps of the Black Range properties that have been idle for years are resuming work. Hoisting machinery is being freighted from Magdalena to the Armour property, 2 miles below the New Era mine. B. S. Phillip, superintendent of the Silver Monument mine, is considering a site for a mill. The Black Range G. M. Co. wants control of the Wing mill and to move it to work the ores of the Minnehaha mine.

OREGON.

BAKER COUNTY.

W. H. Tibbals and other Salt Lake people have bought the Victor group, six claims, Red Boy district. A cash payment of \$3000 is reported to be 10% of the purchase price.

The Pomeroy dredger is lying in a scooped-out lake or basin on Burnt river, near Weatherby, in charge of G. Moore. The boat is 107 feet long, 40 feet wide. Forty buckets on an endless chain scoop up the gravel to the bedrock, dumping it into a steel flume 160 feet long. The steam power of the dredger operates an electric lighting plant. The work has been prosecuted in from 24 to 32 feet of water. Near Weatherby a strike is reported made in the Granite Mountain claims, M. N. Thompson superintendent.

Superintendent Knight is in charge of an adjoining promising property. The Dana (Superintendent Gleason) and the Weatherby-Bonanza each have 5-stamp mills operated by gasoline engines.

Near Durkee the Gold Ridge and the Gold Hill mines each have 10-stamp mills.

The Mammoth mine, Baker City district, has been sold to Michigan men for \$35,000; first payment of \$10,000 made on the 20th. It is located east of the Virtue mine and has been worked for some time with good results.

Sumpter reports that F. W. Bradley of the Bunker Hill & Sullivan mine has been making an examination of the Ibox mine. The concentrating plant on the Badger mine, owned by him, is treating seventy tons of ore a day, concentrating about 20 to 1. There is no tendency to sliming; the saving is satisfactory.

GRANT COUNTY.

W. Beddlg, who gathers rare ores for shipment to Germany for treatment, was at Nampa last week after examination of

the Standard mine and its body of cobalt ore. He will remain at Quartzburg.

JOSEPHINE COUNTY.

The Golden Drift M. Co. expects to have its dam near Grants Pass completed this season. Rogue river at the point where the dam is constructed is 240 feet wide, average depth 6½ feet. The entire length of the dam will be 650 feet. At the bottom the dam is 100 feet wide. A 50-foot apron will be laid up stream, giving a 160-foot surface on the bottom, strengthened by two rows of piling tipped with steel to permit of them being driven into the cement bed of the river. The timbers used are 12x12 inches. The height of the dam is 20 feet and the race is 90 feet wide, 25 feet deep. The hoists will admit ten water wheels, giving 8000 H. P. There will be one pump lifting a 24-inch stream and delivering 22,000 gallons of water per minute. This pump weighs 43,000 pounds. Four other pumps will be installed at first, capable of lifting 9000 gallons each against an 800-foot head.

MALHEUR COUNTY.

A ledge of gold-bearing ore has been discovered on the Lower Willow creek, 20 miles from Huntington. S. J. Russell of Boise, Idaho, is the first locator, but adjoining prospects are also located, there being thirty men there.

UNION COUNTY.

Two rich strikes have been made at Cornucopia, one at the Beer mine, another in a mine owned by J. Mackie.

T. Crawford says the Pomroy dredger, in operation on the John Day river, is a success.

SOUTH DAKOTA.

CUSTER COUNTY.

Deadwood reports a mill test on tin-bearing ore, at the Clara Bell mine, which showed the ore carries about 4% tin.

LAWRENCE COUNTY.

At Cyanide the Gold Edge Co. is sinking a shaft on the north of the Spearfish Co.'s property and are down 300 feet.

The Golden Crest M. Co., owners of the former Chris. Webber property, has decided to construct a cyanide mill.

PENNINGTON COUNTY.

At Hill City, the Gertie Tin Co. has installed an air compressor to sink a 400-foot shaft an additional 100 feet, to demonstrate what may be expected by deep mining for tin in the Black Hills. At the 400-foot level in the Gertie mine, tin ore averaging 5% has been mined and milled, the ore vein being 4 feet in thickness. Development on the Gertie is being pushed by E. C. Johnson.

TEXAS.

JEFFERSON COUNTY.

A large zinc smelter is to be founded in the southern portion of Beaumont.

UTAH.

BEAVER COUNTY.

(Special Correspondence.)—The Copper Ranch M. Co., Rocky Mining district, with headquarters in Salt Lake City, own seventeen claims with 2 miles along the course of the vein, lying midway between the Old Hickory and Montreal mines on the east and the O. K. mine on the west. This company has done about 1100 feet of development work on its claims. It places the vein is 100 feet wide and will carry copper at from 5% upward. At the Jewel mound on the west end of the property, near the O. K. mine, the shaft has reached a depth of 125 feet, showing a body of sulphide ore that will range from 12% to 15% copper, besides carrying some silver and gold, and as high as 64% iron. How wide the vein is at this point can not be stated, but 80 feet above the vein is known to be 105 feet wide between the granite foot wall and porphyry hanging wall. This company will buy a steam hoist, compressor and drills and sink the shaft from 600 to 1000 feet deep. B. T. Lloyd is manager.

The Copper Mountain M. & M. Co., Beaver Lake mining district, with offices in D. F. Walker Building, Salt Lake City, have six claims, with a vein extending 4500 feet in length. The vein is from 12 to 20 feet in width on the surface, which is opened up by several shafts from 10 to 60 feet deep, besides the main shaft which is down 450 feet deep, comprising a shaft 200 feet vertical and 250 feet in the nature of an incline drift along the course of the vein to the west. This incline drift has opened up a body of ore for almost its entire length from 6 feet to 14 feet wide that will run from 18% to 28% copper. The mine is equipped with a horse whim. They are going to install a steam hoist and possibly air compressor and drills, and sink the vertical shaft to the 400-foot level, when they will be able to extract their ore in sufficient quantities for the market.

Salt Lake, August 25.

JUAB COUNTY.

(Special Correspondence.)—The Centennial-Eureka M. Co. of Eureka, which

was closed down for a year, has fifty men employed straightening up around the mine. They have finished retimbering the shaft and expect within the next few weeks to be taking out ore and employing about 200 men. They are overhauling the tramway and terminals, getting ready to handle the ore. They have a double-compartment shaft with double-deck cages. The shaft is 1600 feet deep. The mine is equipped with 660 H. P. engine and 360 H. P. hoilers. They have a machinshop in connection with the mine. The ore is gold, silver and copper, which will be shipped to the U. S. smelter at Bingham Junction, which is nearing completion. R. A. Brown is superintendent.

The Uncle Sam Con. M. Co. of Eureka is working thirty men at present, doing development work. They are not shipping any ore, except from the Humbug—three to five cars per week. The ore contains gold, silver and lead.

Eureka, Aug. 25.

SALT LAKE COUNTY.

The Bulletin reports that in the tunnel 300 feet below the old works of the Bully Boy (United Bingham) a 12-inch streak of black galena is opened up, 64½% lead, 1.6% copper, 30 ounces silver and \$1 in gold per ton. It apparently contains an excess of iron over silica and should sell for close to \$60 per ton.

SUMMIT COUNTY.

The new mill on the properties of the D. & M. M. Co. at Park City has started up. It is stated that the ore will afford as a crude product 12 ounces silver, 14% lead and \$4 gold.

The shaft on the property of the Raymond M. Co., north of Eureka, is now down 1050 feet.

TUCKER COUNTY.

(Special Correspondence.)—The Utah Shale Co. has completed a process for extracting oil from shale ore. They have about 2000 acres near here, 82 miles south of Salt Lake. The vein is 42 feet thick and carries 48% oil. The process is continuous fractional distillation. They are able to save about two barrels to the ton. The oil is a high-grade lubricant and, being distilled, is chemically pure. The property is close to the station. The shale furnishes fuel for the distillation. They will erect a plant for extracting twenty barrels per day between now and the coming fall. Patents are being obtained on the process.

Tucker, August 24.

WASHINGTON.

FERRY COUNTY.

Manager Szontagh of the Northport plant is of the opinion, without having taken up the matter at great length, that the solution to the problem of reducing Republic ores is to roast the product of Republic mines slightly, as is done in Cripple Creek, and then submit them to a cyaniding process. He points out, however, that details must be worked out as the result of lengthy experiments. The Republic ores are not desired at Northport on account of their highly siliceous character.

LINCOLN COUNTY.

The Turk M. & M. Co. at Davenport will install a matting plant upon their property in Cedar canyon, capacity 200 tons, to handle the output of Cedar canyon and the Meteor camps, and the coal will be transported up the Columbia river from Wenatchee.

OKANOGAN COUNTY.

A. G. Wehe, manager Night Hawk, has the tunnel in 515 feet.

SNOWHOMISH COUNTY.

The Victory group, west fork of Silver creek, above Mineral City, has been bonded to Minneapolis men for \$30,000, \$5000 cash. There are six claims in the group. The ore consists of chalcopryite, arsenical iron and galena, carrying gold, silver and copper.

SPOKANE COUNTY.

Spokane reports that a committee of lead mine owners has been appointed by the mine owners to investigate the practicability of maintaining independent smelters at Spokane and Danver. The reason assigned is that the Western lead miners have been unable to get fair dealing from the lead trust, and now propose to manufacture their own product and market it. The men in the new deal produce 45% of the lead mined in the United States. The Spokane smelter would use ores from Republic and the Cœur d'Alenes.

STEVENS COUNTY.

The Northport smelter has a supply of lime rock, mined in a quarry 4 miles from the smelter and delivered at the plant for 51 cents a ton.

WYOMING.

The following expenditures and betterments are reported planned for the Ferris-Haggarty mine: Improvements to mine, \$200,000; smelter enlargement and converter, \$150,000; concentrator, \$140,000;

dam and pipe line, \$100,000; electric pipe line, \$50,000; water works and reservoirs, \$60,000; total, \$700,000. With the \$1,000,000 paid for the mine and \$300,000 for the Southern Wyoming tramway, the company will have expended \$2,000,000.

CARBON COUNTY.

J. S. Carey, president North American Copper Co. and Mine & Smelter Supply Co., and W. G. Emerson, president Southern Wyoming Tramway Co., will transfer the Ferris-Haggarty copper mine to the North American Copper Co., the corporation recently organized for the purpose of consolidating interests in the Grand Encampment and Battle Lake mining districts. The first payment of \$250,000 on the purchase price of \$1,000,000 will be made Sept. 1; second payment of \$250,000 to be made within six months; but the purchasers are not to take any ore from the mine until this payment is made. The third and fourth payments are to be made at intervals of ninety days from the date of the second payment, so that the entire sum of \$1,000,000 will be paid in full within one year from Sept. 1, 1902. The first six months will be devoted to development work in the underground workings, and putting the mine in shape to produce on an extensive scale. The last towers of the Grand Encampment-Battle Lake aerial tramway have been erected, and next the cables will be strung clear through from the smelter at Encampment to the Ferris-Haggarty mine. Work is progressing on the electric power plant at Encampment, to generate sufficient power from the waters of the north fork of the river to run the tramway, smelter and Ferris-Haggarty mine.

Work in the Ferris-Haggarty copper mine resumes Sept. 1. The tunnel is now in 1050 feet; about 100 feet more work remains to be done to bring the breast of the tunnel under the old shaft. An upraise of 60 feet will make the opening into the old workings.

LARAMIE COUNTY.

The Globe Copper Mining Co., Silver Crown district, formed of Colorado Springs men, own 430 acres of valuable land and are developing it. A double-compartment shaft has been sunk 150 feet and work is progressing.

FOREIGN.

AUSTRIA.

The Austrian mercury mines are situated at Idria, in the Province of Carniola, and are a government undertaking. They have been worked upwards of 300 years, the third century having been completed in the year 1880. About 1200 workmen are in regular employment. The working day consists of eight hours if in the mine, and ten hours if outside. The mine produces annually about 800,000 quintals of raw material. Three blasting furnaces exist. Five thousand quintals of pure commercial mercury is produced, and 460 quintals of vermillion, per annum. The total revenue in 1870 rose to 2,000,000 florins, but in 1880 it fell to 385,000 florins. The latest statistics have not been published. From paragraphs that have appeared in the local newspapers, it would seem that the mines are not working quite satisfactorily, and there is some talk of closing the works. Mercury has been recently discovered at Spizza, in Dalmatia, and it promises good results. A commission has been appointed to study the question.

BRITISH COLUMBIA.

At Grand Forks the Granby smelter, which was closed down, owing to the coke famine, resumed operations last week. The ovens of the Crow's Nest Coal Co. at Michel are now turning out 200 tons of coke daily.

The July returns from the Ymir mine show that fifty stamps were in operation 675 hours, the estimated profits amounting to \$6850, besides \$3730 for development and \$1390 for repairs, etc. The total net profit made by the mines during the first half of the present year is \$52,535.

The Velvet mine has resumed shipments. This time the ore is being sent to the Northport smelter.

The Cariboo Development Syndicate of Rossland is buying property in the Lardeau. The Mohican group of three claims has been acquired. The Mohican is a tunneling proposition, giving assays of \$80 per ton. The group is 12 miles from the smelter at Ferguson.

Forty-three thousand eight hundred and fifty-four dollars is the value of the ingot sent from the Consolidated Cariboo hydraulic mine at Bullion to the assay office at Vancouver.

MEXICO.

CHIHUAHUA.

The Guggenheim Exploration Co. has started its new 450-ton mill and the machinery is found to be most thoroughly satisfactory.

The Guggenheim E. Co. has the Madronos group of mines from J. F. Johnstone under bond and lease.

The Compania de Fundadora de Fierro y Acero, of Monterey, have begun elaborate development on two properties secured in the El Valle district.

The Guggenheim E. Co. have started their new 450-ton mill.

OAXACA.

Masterson & Brower of El Paso, Texas, have bought from the Oaxaca M. & M. Co. the Castras Ana group of gold mines, 50 miles from Oaxaca; \$800,000 in gold is to be paid for the property.

SONORA.

Heavy rains are reported in the Altar district. The reservoir of the Sonora M. & M. Co., at Penasco Quemado, is filled with water, which means blowing in of the smelter and a long run.

The Cananea, Yaqui River & Pacific Railroad Co., E. Randolph president and general manager, will put engineers in the field to find routes for extensions of the Cananea road north and south. The plan contemplates a road north and south through Arizona and into the coal fields of New Mexico and Colorado, and south from Cananea lines will be run along the coast of the Gulf of California through Sonora and into Sinaloa.

"All of our skilled labor in the Pintos mine at San Jorge are Yaqui Indians," says H. Heffrin, one of the owners of the Pintos property in Sonora. "As workmen, they are superior to the best Mexicans we can get. All of our blacksmiths and men in positions where the work is most difficult, and where head work is required, are the Yaquis. They are intelligent and industrious. They are unlike any of the other Indians. Some of them are fighters, but those in our employ are harmless. San Jorge is 250 miles from the nearest railway station—Gila Bend, Ariz. We are in the wildest part of the country, but there is plenty of gold that may be taken out at a profit in spite of the great distance from railway facilities."

From C. A. Kaiser, assistant manager Yaqui Copper Co., Campo Santo Nifio, the Oasis learns that there are 150 men at work underground, others being put on, and it is anticipated that by October 1 there will be 500 at work in ore.

NOVA SCOTIA.

(Special Correspondence.)—The Napa mine at Wine Harbor is taking out twenty tons of ore daily from the 50-foot level. Between the walls they are breaking 14 feet of quartz and slate—principally quartz—milling 3½ dwts. per ton. They have a 15-stamp mill, hoisting engine and pump. This property had been abandoned for many years and has recently been pumped out by L. W. Getchell.

The Plover Lead M. Co. at Wine Harbor is owned and operated by J. S. Lowe general manager, M. McGrath superintendent, and has been worked two years. These people have a 15-stamp mill, hoisting and pumping plant. They are down 190 feet. At that depth their ledge is 18 feet between walls. The ore is milling 7 dwts. per ton.

The Royal Oaks mine at Goldenville is owned by Boston and Nova Scotia men and managed by J. W. McIntosh of Nova Scotia. They have 300 acres and six distinct ledges varying in width from 6 inches to 8 feet. The principal ledge on which they are now working is down 160 feet, which is 3 feet wide at the bottom. Levels are driven every 50 feet. They are milling thirty tons per day—6 dwts. per ton. They have a 10-stamp mill in operation and ten more stamps ready to start up. They have two hoisting plants and one pumping plant. This company is using American made machinery.

The Lake Lode mine at Caribou is owned by L. W. Getchell and A. S. Dunham of Baltimore, Md. They have a double-compartment shaft down 700 feet, the deepest in Nova Scotia. At the 700-foot level the ledge is 6 feet and mills 3½ dwts. They have a complete 40-stamp mill, a 10-drill air compressor, 40 H. P. hoisting plant and 100 H. P. engine. They are mining and milling their ore at a cost of \$1.25 per ton.

The mining companies in this country cannot own the ground; they lease from the Government. Mining property is divided into areas. An area is a fraction less than one acre. The mining company leases this area from the Government at 50 cents per annum. They also pay a royalty of 2% on all ore extracted. If the royalty exceeds the rent collected for the area, the rental is deducted.

Wine Harbor, Aug. 5.

ITALY.

C. B. Flynn, who has interests in American and Mexican copper mines, has organized the Anglo-Italian Copper Syndicate, which has purchased 12,000 acres near Genoa for carrying on its business. Orders for smelters of 500 tons daily ca-

capacity of ore have been placed in Germany and the United States.

THE YUKON.

Klondike reports the greatest exodus from Yukon river points now in progress. Not since the rush inward of 1897 and 1898 have so many people been traversing the 700-mile stretch between Dawson and Skagway as now. In two days last week 1200 men started up the river. Five hundred had previously left, and not less than 1500 more will come out between now and September 15. There are several reasons for the exodus. It is primarily hastened by the fierce rate war on between the steamers of the White Pass Railway and independent lines. Rates have been cut from \$60 first class and \$40 second class to \$18 and \$9. Dawson has had a large surplus population all summer. This included 600 men who went in expecting to get work on the Klondike Mines Railway, to be constructed from Dawson up Klondike creek toward Stewart river. Surveys and preliminary work are going on, but construction work has been delayed by non-completion of financial arrangements in New York. These workmen are now coming out rather than winter in Yukon.

Personal.

D. McVICHIE has returned to Salt Lake, Utah, from Boston.

JAS. FINLEY is resident manager Sullivan mine, Fort Steele, B. C.

J. P. BOYLE is superintendent April Fool mine, De Lamar, Nev.

VALENTINE HAY is examining mines at Pyramid district, Nevada.

A. R. GIBSON is examining mining properties at Clifton, Arizona.

C. K. McCORMICK has returned to Salt Lake City, Utah, from Europe.

J. A. BUSH is reporting on Idaho Springs, Colo., mining property.

E. H. MacDonald has been appointed city engineer of Anaconda, Mont.

A. L. NATHAN has been elected superintendent Telluride, Colo., Coal Co.

D. B. WHITMAN is now foreman Arizona-Colorado property, Globe, Ariz.

W. S. MARSHALL is manager Idaho Springs, Colo., Gold Producing Co.

JOHN BLACKFORD is superintendent Golden Reward mines, Terry, S. D.

J. T. DONAHOE is the new superintendent of the Gold Eagle group, Boise, Idaho.

D. W. SHEPARD is superintendent Anglo-Saxon M. Co., Georgetown, Colo.

N. B. KNOX of San Francisco has been examining the Erie mine at Graniteville, Cal.

O. R. SMITH now represents the International G. M. & M. Co. at Lordsburg, N. M.

L. BAMBERGER of Salt Lake, Utah, is examining mining property at Bolse Basin, Idaho.

MR. H. GRAHAM, manager Frazer River Gold Dredging Co., is dredging near Lytton, B. C.

SUPERINTENDENT SIEBERT of the Tonopah mines has returned from San Francisco.

M. B. FITCH, Magdalena, N. M., is the new superintendent Columbia M. Co. at Esther, Mo.

A. H. PHILLIPS of Trenton, N. J., mineralogist for Princeton University, is at Butte, Mont.

ASA BALDWIN is consulting engineer Ohio-Deadwood G. M. Co., Deadwood, South Dakota.

F. M. ISH, manager Weepah M. Co., Nevada, is at Owens river examining sites for water power.

WILLIAM BLACK is in charge of the new sulphuretted works at the Delhi mine, Nevada county, Cal.

F. M. MILLER, of Grass Valley, Cal., is examining the Leland and Mitchell properties, Boundary Cove, Arizona.

CHARLES BUTTERS is expected in Cripple Creek district, Colo., to erect a plant for treating low-grade ores.

EDWARD G. WITT, 137 First street, is the San Francisco representative of F. W. Braun & Co. of Los Angeles, Cal.

HUGH ROSE of the War Eagle and Center Star M. Cos., Rossland, B. C., has returned from Cripple Creek, Colo.

C. H. PALMER, formerly manager Butte & Boston Co., Butte, Mont., is examining mining properties at Sheridan, Mont.

A. STANSFIELD, professor of metallurgy at McGill University, Montreal, Canada, has returned there from Nelson, B. C.

W. ROSLINGTON, representing F. W. Braun & Co., Los Angeles, Cal., is traveling through the Black Hills (S. D.) districts.

G. A. OVERSTROM of Chicago, patentee

of the Overstrom table, has been in Park City, Utah, placing one of his tables at the Silver King mill.

J. B. HIGGINS has been appointed superintendent of the Mill Creek mine, Plumas county, Cal., recently purchased by M. C. Miller of Minneapolis.

HARRY MARTIN, former superintendent Iron Mask mine, Rossland, B. C., has gone to Butte, Mont., as foreman in a mine under the superintendency of S. Hall.

DUNCAN McDONALD of Virginia, Nev., has gone to San Salvador, where he will have charge of the underground workings of a mine owned by the Charles Butters Co.

C. M. EYE has resigned as superintendent Alpine mine, Georgetown, Colo., to take a position with the War Eagle Con. M. & D. Co. as smelter representative at Trail, B. C.

W. J. COX, superintendent Mollie Gibson and A. J. properties, Cripple Creek, Colo., has resigned and goes as superintendent and manager Camp Bird mine, Ouray, Colo.

F. MERTSHEIMER has been appointed superintendent of machinery of the Denver & Rio Grande Railway, with office at Denver, Colo., succeeding H. Schlacks, who resigned.

C. F. SCOTT, chief electrician of the Westinghouse Electric & Manufacturing Co., and president of the American Institute of Electrical Engineers, has returned from England.

G. D. B. TURNER, former manager Revenue mine, Madison county, Montana, is now managing the property of the J. I. C. Co., Park City, Utah, and is sinking a 600-foot shaft.

ALEXANDER BARING of London, England, who made a recent trip from Sumpter, Or., to Portland, Or., is locally credited with a desire to buy the E. & E. mine from Jonathan Bournie.

E. G. RUST, general superintendent Colorado Fuel & Iron Co.'s works at Pueblo, Colo., and A. H. Helander, chief engineer, have resigned to open an engineering office in Philadelphia, Pa.

Catalogues Received.

"Catalogue No. 15, 1902, The Jackson Hand Power Rock Drill & Equipment," describes and illustrates this mechanical device and tells just what a miner would want to know about it. A request to the Denver office, 1758 Larimer street, or to 52 Broadway, the New York office, to H. D. Crippen, will bring it to any address.

The American Engineering Works, 204 Dearborn street, Chicago, Ill., has a new circular (No. 22) describing the Overstrom plug for use in concentrating mills, a solid rubber plug designed to displace the wooden plugs used. It is made in all sizes likely to be in demand and has an internal cone of such form that the opening will not be easily clogged with sticks or refuse. They show in their circular a full size cut in end view and section.

The current edition (August, 1902) of the Lunkenheimer Co.'s illustrated Catalogue and Price List is rewritten and revised, and, as is the usual style of this company, has a distinctive value. Any one reading this 208-page booklet must be favorably impressed by its clear-cut, concise, down-to-date compendium of information on valves, injectors, lubricators and steam specialties. A request for a copy to any of the company's addresses—Cincinnati, Ohio; Denver, Colo.; 26 Cortlandt street, New York City; 27 North Seventh street, Philadelphia; 35 Great Dover street, London, S. E., England—will be immediately complied with.

Catalogue No. 126 of the Chicago House Wrecking Co. contains 240 pages of illustrated description of a very large variety of merchandise. The company buys big lots at sacrifice values, dismantling such mammoth enterprises as the World's Fair of Chicago, the Trans-Mississippi Exposition of Omaha, Neb., the Chicago post-office, etc. Their establishment covers 1,000,000 square feet of space in which they have a vast amount of material that is offered at prices that merit the attention of close buyers. They invite visitors to see their extensive warehouses, and will send a copy of the catalogue upon application to the Chicago House Wrecking Co., West 35th & Iron Sts., Chicago, Ill.

Commercial Paragraphs.

ALLIS-CHALMERS CO. at their Denver office have the order for all the machinery necessary to increase the bromide plant of the Telluride Reduction Co. at Colorado City, Colo., from 100 tons of ore to 300 tons per day. The increase consists in part of two 100-ton Wetthey mechanical

roasting and cooling furnaces, two 100-ton revolving driers, four large sets of rolls, the necessary Montejus tanks, elevators, screens, etc., aggregating 300 tons of machinery. The Denver office of Allis-Chalmers Co. also reports the sale of a first motion hoisting engine to the Theresa G. M. Co., Goldfield, Colo.

THE Denver Engineering Works Co. has shipped a complete 10-stamp mill, including complete sawmill plant, to R. B. Pratt, Thomasville, Colo. In this mill will be used one of the new hydraulic classifiers developed by them from experiments and data obtained by Professor Richards on this subject. They are also shipping material for a 40-stamp mill for the Penobscot Mining Co., Deadwood, S. D. They will have ready for distribution their Spitzkasten, or Hydraulic Classifier Bulletin, by September 1. They state that by the use of this new Spitzkasten, or hydraulic classifier, the Gregory-Bobtail mill at Black Hawk, Colo., has increased the savings of values from the ore from 55% to 90%.

C. P. MASON, manager Fairbanks-Morse Co. of Salt Lake City, Utah, reports the following sales: One gasoline motor car; one large water heater and purifier for Idaho; one set 18 inch Sturtevant high-speed rolls, three Sturtevant toggle screen separators for Mayday mill, Eureka, Utah; twenty-two assorted scales for mines, merchants, consumers, railroads and smelters; 54 H. P. gasoline engine; sixteen gasoline engines, with centrifugal pumps, for irrigation in Idaho; three horse whips, five ore cars, carload sixteen-pound rails, wire rope and supplies for iron mines, Cedar City, Utah; wire rope and supplies for Tonopah district, Nevada; three mining cages, six mining cars, ore skip, four gasoline hoisting engines from 12 H. P. to 44 H. P., two 60 H. P. gasoline engines for Tonopah, Nevada, for air compressor duty.

AT Sobrante, Cal., the new plant of the International Explosives Co. is being completed, nine wooden buildings adjoining the works of the Giant Powder Co. The company is capitalized at \$1,000,000 and owns 52 acres of land. A. B. Holland, of Oakland, is president; R. B. Mott, vice-president; F. Dassonville, secretary, H. C. Stillwell, general manager. The daily capacity of the plant with the present amount of machinery is 2000 pounds of powder. This capacity can be increased by erecting one additional building and more loading machines. A full stock of material is on hand for the manufacture of a new powder. The base is chlorate of potash. This chemical has been very difficult to use on account of a tendency to explode, but the inventor of the process, W. C. Quimby, is stated to have a safe method of working it. It is mixed with other chemicals in a dry state. No acid is used; this reduces the cost considerably, as the acid plant is a large item in the cost of plants for the manufacture of nitroglycerine powders. The officers state the new powder gives off no nitrous-oxide fumes, will not freeze and is not affected by climatic influences. It is claimed that it can be produced cheaper than the nitroglycerine powders and will not explode by concussion. The saving in expense on No. 2 powder is said to be 2 cents per pound. The new company is not connected with any pool or combination, is not restricted to any particular territory for a market, and proposes to export powder.

It is an idea with some present and prospective advertisers that pleasant personal mention in the columns of a trade paper are vastly valuable. While mention in any way in a journal of considerable circulation is of value in creating publicity, yet there is a tendency at times to overestimate the value of "puffs" and laudatory mention. No rightly constituted man objects to favorable mention of himself or his business in a paper seen by prospective patrons, and no properly conducted journal objects to such favorable mention when deserved; but, after all, such mention is of minor importance to the matter of general interest. The question for an advertiser to consider is not, "Will that paper say nice things about me?" but "Has that paper the circulation among probable customers that would justify my paying for space in its advertising columns?" Is the paper of sufficient value to men likely to be my customers to induce them to buy it? Men don't buy a paper for the pleasure of seeing the handsome personal paragraphs it may publish about the clever Mr. A., or the rich Mr. B., the great Mr. C., or the eminent Mr. D. Men buy it for news, information, and in their work, and, just so far as it is able to supply the wants or expectations of its subscribers, it prospers. The paper that is of real value to the advertiser is not the one that is filled with little personal puffs and praise of people, cared for only by those so puffed and praised. The

trade paper of value to the advertiser is filled with the latest and most authentic general and technical information on the subjects of greatest general interest in its line, and in which the personal element is subordinated to the requirements of a great many men who want the latest and best concerning their daily business.

Clifton, Ariz., Copper District.

A comprehensive report of the occurrence of copper in the vicinity of Clifton, in southern Arizona, is being prepared by W. Lindgren, geologist of the U. S. Geological Survey. The field work on which the report is based was commenced early in November last. The mines near Clifton produce at present approximately 2500 tons of copper a month, and the mining district ranks third among the copper producers of the Territory, only United Verde and Bisbee exceeding it. The Geological Survey had previously prepared a detailed topographic map of the region, and the geologic work begun in the autumn was completed in the winter. Special attention was given to a study of the mines, in which portion of the work four months were spent. The results will be of general interest, as the investigation largely dealt with the secondary concentration so common in copper deposits, and also with the character of the original deposits, which are remarkable, inasmuch as they consist of masses of limestone altered by contact-metamorphic processes.

Production of Lead.

The production of lead in the United States in 1901, says Charles Kirchhoff in Mineral Resources of the United States, 1901, now in press. United States Geological Survey, was fully up to the high total which was attained in 1900, although the output of individual districts varied somewhat.

The total production of refined lead in 1901 amounted to 381,688 short tons, as compared with 377,679 short tons in 1900. Of this total production in 1901, the net American production was 270,700 short tons, almost exactly the same as in 1900.

The total output of the Mississippi valley footed up to about 67,000 tons, or about one-fourth of the whole production of the country. Idaho continues the principal contributor, fully 75,000 tons of the total coming from that State, and nearly all being the product of the Coeur d'Alene mines. Colorado yielded about 73,000 tons in 1901, Leadville remaining the largest single district, although in 1901 this district furnished less lead than in former years. The production of Utah has been well maintained, the quantity being 49,870 short tons, about 1800 tons in excess of the production of 1900.

The estimated consumption of lead in 1900 was 269,905 short tons, as compared with 269,302 tons in 1900, and with 226,315 tons in 1899.

The total value of the lead imported for consumption in the United States in 1901 was \$364,459, as compared with \$702,213 in 1900. The value of the exports of lead from this country in 1901 was \$624,534, as compared with \$459,571 in 1900.

During the first eleven months of 1901 the price of lead was maintained at 4.375 cents at New York, but in December the American Smelting & Refining Co. reduced the price to 4 cents. During the whole year the lead market was held stationary by main force, although the quantities which consumption would not absorb were added to the stock in first hands. Low prices prevailed in Europe during the year, and toward the close of the year they reached a figure in the London market which is equivalent to 2 40 cents per pound here.

New Patents.

DEWEY, STRONG & Co.'s SCIENTIFIC PRESS PATENT AGENCY, 330 Market St., S. F., has official reports of the following U. S. patents issued to Pacific coast inventors:

FOR THE WEEK ENDING AUG. 19, 1902.
707,191.—NEEDLE THREADER—O. A. Alcardi, S. F.
707,292.—TUBE EXPANDER—H. M. Barr, Wadsworth, Nev.
707,195.—POSTAL BOX AND SIGNAL—F. C. Bates, San Jose, Cal.
707,297.—CHUTE—F. W. Brink, Tacoma, Wash.
707,385.—ORE BREAKER—A. C. Calkins, Los Angeles, Cal.
707,307.—CAN OPENER—J. Chisholm, Fort Liscum, Alaska.
707,028.—RIBBON FASTENER—F. O. Garrison, Portland, Or.
707,321.—CLUTCH—H. B. Harding, Los Angeles, Cal.
707,250.—ROOF, ETC., CONSTRUCTION—B. McDougall, S. F.
707,340.—RUNNING GEAR—A. A. Medina, San Jose, Cal.
707,161.—SURVEYING INSTRUMENT—J. C. Sala, S. F.
707,359.—BICYCLE GEAR—P. J. Scharbach, Pe Ell, Wash.
707,287.—THRESHER—J. G. Walker, Moro, Or.

Latest Market Reports.

SAN FRANCISCO, Aug. 29, 1902.

METALS.

SILVER.—Per oz., Troy: London, 24½d (standard ounce, 925 fine); New York, bar silver, 52½c, refined (1000 fine); San Francisco, 52½c; Mexican dollars, 440 San Francisco, 41½c New York.

COPPER.—New York: Standard, \$10.75@11.15; Lake, 1 to 3 casks, \$11.55; carload lots, \$11.40; Electrolytic, 1 to 3 casks, \$11.30; carload lots, \$11.00; Casting, 1 to 3 casks, \$11.40; carload lots, \$11.25. San Francisco: \$14.00. Mill copper plates, \$17.00; bars, 18@24c. London: £51 10s spot per ton.

LEAD.—New York, \$4.12½; Salt Lake City, \$3.50; St. Louis, \$4.00; San Francisco \$4.50, carload lots; 4½c 1000 to 4000 lbs.; pipe 5½, sheet 6, bar 5½c; pig, \$4.75. London: £11 2s 6d per ton.

SPELTER.—New York, \$5.50; St. Louis, \$4.50; London, £19 2s 6d per ton; San Francisco, ton lots, 6c; 100-lb lots, 6½c.

ANTIMONY.—New York, Cookson's, 9½c; Hallett's, 8½c; San Francisco, 1000-lb. lots, 10c; 300 to 500 lbs., 11c; 100-lb. lots, 13@15c.

TIN.—New York, pig, \$27.80; San Francisco, ton lots, 29c; 1000 lbs., 29c; 500 lbs., 29c; 200 lbs., 29c; less 30c; bar tin, 30c, 35c. London, £125 12s 6d spot.

PLATINUM.—San Francisco, crude, \$18.00 @ oz.; New York, ingot, \$19.00 per Troy oz. Platinum ware, 75@80c per gram.

QUICKSILVER.—New York, \$48.00 large lots; London, £8 15s; San Francisco, local, \$46.00 @ flask of 76½ lbs.; Denver, \$49.75. Export, \$44.50.

BABBITT METAL.—San Francisco, No. 1, 10c; No. 2, 7c; No. 3, 6½c; extra, 17½c; genuine, 35c; Eclipse, 37½c.

ALUMINUM.—New York, No. 1, 99% pure ingots, 35c; No. 2, 90%, 30c to 34c.

SOLDER.—Half-and-half, 100-lb. lots, 19.50c; San Francisco, Plumbers', 100-lb. lots, 16½c.

NICKEL.—New York, 50@60c @ lb.; ton lots, 45@48c.

STRUCTURAL MATERIALS.

IRON.—Pittsburg, Bessemer pig, \$21.75; gray forge, \$21.00; San Francisco, bar, 3c @ lb., 3½c in small quantities.

STEEL.—Bessemer billets, Pittsburg, \$31 and \$32; open hearth billets, \$33 and \$34; San Francisco, bar, 7c to 12c per lb.

CHICAGO CURRENT QUOTATIONS.

Bessemer.....	\$23.50@24.50
Foundry Northern 1.....	22.50@23.00
Northern 2.....	21.50@22.50
Northern 3.....	21.00@22.00
Southern 1.....	21.40@22.65
Southern 2.....	20.65@21.65
Southern 3.....	20.15@21.15
Forge.....	19.65@20.65
Charcoal.....	24.00@24.50
Billets, Bessemer.....	33.00@34.00
Bars, iron.....	1.85@1.95
Bars, steel.....	1.75@1.85
Rails, standard.....	28.00@30.00
Rails, light.....	34.00@40.00
Plates, boiler.....	1.90@2.00
Tank.....	1.75@1.80
Sheets, 26 store.....	3.25@3.40
No. 27.....	3.35@3.50
No. 28.....	3.45@3.60
Angles.....	1.75@1.80
Beams.....	1.75@1.85
Tees.....	1.80@2.00
Zees.....	1.75@2.25
Channels.....	1.75@2.25
Steel melting scrap.....	19.00@20.00
No. 1 railroad wrought.....	21.00@22.00
No. 1 cast, net ton.....	15.00@16.00
Iron rails.....	24.00@25.00
Car wheels.....	21.00@22.00
Cast borings.....	10.00@10.50
Turnings.....	14.00@14.50

CEMENT.—Germania, \$2.90; K. B. & S., \$2.90; Hewmore, \$2.85; Trowell, \$2.85; Portland, \$3.25 per bbl.

LIME.—Santa Cruz, \$2.00; Roche Harbor, \$2.00 per bbl.

LUMBER.—(Retail): Pine, ordinary sizes, \$20.00@22.00; extra sizes higher; redwood, \$22.00@23.00; lath, 4 feet, \$4.25 @ 4.50; pickets, \$19.50; shingles, \$2.35 for No. 1 and \$2.00 for No. 2; shakes, \$13.50 for split and \$14.50 for sawed; rustic, \$26.00 @ 32.00.

NAILS.—Per keg (list prices): No. 20d to 60d, Wire, \$3.50; Cut, \$3.50; 10d to 16d, Wire, \$3.55; Cut, \$3.55; 8d, Wire, \$3.60; Cut, \$3.60; 6d and 7d, Wire, \$3.70; Cut, \$3.70; 4d and 5d, Wire, \$3.80; Cut, \$3.80; 3d, Wire, \$3.95; Cut, \$3.95; 2d, Wire, \$4.20; Cut, \$4.20. Special rates for carload lots.

GENERAL SUPPLIES.

POWDER.—F. o. b. San Francisco: No. 1, 70% nitro-glycerine, per lb., in carload lots, 15½c; less than one ton, 17½c. No. 1*, 60%, carload lots, 13½c; less than one ton,

15½c. No. 1** 50%, carload lots, 11½c; less than one ton, 13½c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2* 35%, carload lots, 9½c; less than one ton, 11½c. No. 2** 30%, carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 725 kegs, \$1.50 per keg; less car lots, \$2 per keg.

CAPS.—3x, \$5.50 per 1000; 4x, \$6.50; 5x, \$8; Lion, \$9, in lots not less than 1000.

FUSE.—Triple tape, \$3.60 per 1000 feet; double tape, \$3.00; single tape, \$2.65; Hemp, \$2.10; Cement No. 2, \$3.00; Cement No. 1, \$2.65, in lots of 3000 feet and up.

CANDLES.—Granite 6s, 16 oz., 40s., 10c @ set; 14 oz., 40s., 9c.

COAL.—San Francisco, coast, yard prices: Wellington, \$3; Seattle, \$6.50; Coos Bay, \$5.50; Southfield, \$3.00. Cargo lots, Eastern and foreign: Wallend, \$7.00; Brymbo, \$7.50; Pennsylvania, h.d., \$14.00; Scotch, \$8; Cumberland, \$12; Cannel, \$11.50; Welsh Anthracite, \$13.00; Rock Springs, \$8.50; long ton, Colorado Anthracite, \$14.00. Coke, \$13 per ton in bulk, \$15 in sacks; Sunnyside, \$11.50, long ton.

CHEMICALS.—Cyanide of potassium, 98%—99%, jobbing, 27@28c @ lb.; carloads, 25@26c; in 10-lb. tins, 38c; sulphuric acid, in carboys, 66% B, 2c @ lb.; soda ash, \$2.00 @ 100 lbs.; hyposulphite of soda, 24@30c @ lb.; blue vitriol, 54@63c @ lb.; borax, concentrated, 7@8c @ lb.; chlorate of potash, 12@13c; red sulphur, 5c; alum, \$2.00@2.25; flour sulphur, French, 24@25c; California refined, 14@25c; nitric acid, in carboys, 8c @ lb.; caustic soda, in drums, 34@40c @ lb.; Cal. s. soda, bbls., \$1.25 @ 1.50 @ 100 lbs.; sks, \$1.05; chloride of lime, spot, \$2.50@2.60; nitrate of potash, in bbls, 8c; caustic potash, 10c in 40-lb. tins.

OILS.—Linsseed, boiled, bbl., 69c; cs., 74c; raw, bbl., 67c; cs., 72c; lots of 5 bbls., 1c less; Lucol oil, boiled, bbl., 59c; cs., 64c; raw, bbl., 57c; cs., 62c. Kerosene—Pearl, per gal., 20c; Astral, 20c; Star, 20c; Extra Star, 24c; Ecocene, 25c; Elaine, 22c; Water White, in bulk, 13½c; Mineral Seal, iron bbls., 19c; wooden bbls., 22½c; cs., 25c; Mineral Sperm, cs., 26½c; Deodorized Stove Gasoline, bulk, 17c; do., cs., 23½c; 88° Gasoline, bulk, 21c; do., cs., 27½c; 63° Naphtha or Benzine, deodorized, in bulk, per gal., 16c; do., in cs., 22c; Lard Oil, No. 1 bbl., 95c; cs., \$1.05; Neats-foot Oil, bbl., 70c; cs., 75c; No. 1 bbl., 62½@55c; cs., 57½@60c; Sperm, crude, 60c; Natural White, 65c; Bleached do., 70c; Whale Oil, cs., 55c.

WHITE LEAD.—Per lb., in kegs: Five tons and over at one purchase, per lb., 6½c; 1 ton and less than 5 tons, per lb., 6½c; 500 lbs. and less than 1 ton, per lb., 7c; less than 500 lbs., per lb., 7½c; in 25-lb. tin pails, ¾c per lb. above keg price; in 1 and 5 lb. tin cans, 100 lbs. per case, 2½c per lb. above keg price. Dry Lead—In bbls., 1 ton and over, 6c; do. in kegs, 6½c.

RED LEAD AND LITHARGE.—One ton and over at one purchase, per lb., 7c; 500 lbs. and less than 1 ton, per lb., 7½c; less than 500 lbs., 7½c.

ASSAY LITHARGE.—Per lb., 8½c.

BISMUTH.—Subnitrate, per lb., \$1.60.

BONE ASH.—40 @ lb.

BORAX.—Crystal, 7c; calcined, 25c.

CHROMIUM.—(90% and over) per lb., \$1.25.

COPPER.—Carbonate, 20c; Red oxide, 30c, 60c.

MAGNESIUM.—Per lb., \$3.00.

MANGANESE.—(90% and over) @ lb., \$1.25.

MERCURY.—Bichloride, @ lb., 90c.

MOLYBDENUM.—25c @ gramme; 1000 grammes—2½ lbs.

PHOSPHORUS.—(American) @ lb., 80c.

SILVER.—Chloride, @ oz., 75c; nitrate, 55c.

SODIUM.—Metal, @ lb., \$1.00.

URANIUM.—Oxide, @ lb., \$3.50.

ZINC.—Metallic, chemically pure, @ lb., 50c.

ZINC.—Dust, @ lb., 10c.

ZINC.—Sulphate, @ lb., 10c.

(These prices are wholesale, f. o. b. San Francisco, unless otherwise noted.)

Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

POSTAL BOX AND SIGNAL.—No. 707,196. August 19, 1902. F. C. Bates of San Jose, Cal. Assigned to Bates-Hawley Postal Box Signals Co., a corporation, of same place. The object of this invention is to provide a signal device attached to postal boxes and operated by the opening thereof so that the signal is exposed and indicates to the proper person that there is something in the box for removal, and to drop the signal after the contents have been removed. The box is so constructed as to prevent the entrance of dampness from storms, and the doors are so disposed that the largest packages may be introduced or removed and the box fully exposed for inspection.

ROOF, CEILING AND FLOOR CONSTRUCTION.—No. 707,250. August 19, 1902. B. McDougall, San

Francisco, Cal. This invention comprises improvements in the construction of floors, ceilings and roofs so that a horizontal partition can be constructed with a minimum depth and weight consistent with the necessary strength and which shall depend solely upon the walls for support, obviating the necessity of supporting columns, cross walls, trusses or arches. It consists of a series of joists or bars radiating from a common center, having the outer ends fully supported and concentric bands or rings engaging the bars and uniting them into a rigid structure, together with interspersed strips, and means by which all the elements are firmly secured together.

NEEDLE THREADER.—No. 707,191. August 19, 1902. O. A. Aleari, San Francisco, Cal. This invention provides a mechanical means for threading needles of any character. It consists of a support or stand, a horizontal guide, a threader reciprocable along the guide and a needle holder in the path of the threader, with means by which the needle is always made to present its eye to the threader and to be engaged thereby. The means are provided for adjustment and for severing the thread.

TUBE EXPANDER.—No. 707,292. August 19, 1902. H. M. Barr, Wadsworth, Nev. This invention is designed to expand the ends of tubes after they have been placed in the heads of the boiler. It consists of a reeling tool comprising revolvable rollers, a mandrel or spreader, a sleeve screw threader arranged in the casing and a reel, which the mandrel is adapted to abut as it is driven home, and a suitable gauge plate. The spreader will automatically release itself after the tube has been properly expanded.

ASSESSMENT NOTICES.

MARINA MARICANO GOLD MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Sunny Hill, Shasta County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 27th day of August, 1902, an assessment (No. 3) of three (3) cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the secretary, at the office of the company, 415 Front street, San Francisco, California. Any stock upon which this assessment shall remain unpaid on the 28th day of September, 1902, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 29th day of October, 1902, to pay the delinquent assessment, together with the costs of advertising and expenses of sale. By order of the Board of Directors.

OHAS. BOVONE, Secretary.

Office—415 Front street, San Francisco, California.

VALLEY WATER COMPANY.—Location of principal place of business, No. 316 California street, San Francisco, California; location of works, near Coalinga, San Bernardino County, California.

Notice is hereby given, that, at a meeting of the Board of Directors, held on the 22nd day of August, 1902, an assessment (No. 3) of five dollars (\$5) per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the secretary, at the office of the company, No. 316 California street, San Francisco, California. Any stock upon which this assessment shall remain unpaid on the 30th day of September, 1902, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on THURSDAY, the 23rd day of October, 1902, to pay the delinquent assessment, together with the costs of advertising and expenses of sale. By order of the Board of Directors.

R. A. LEWIN, Secretary.

Office, No. 316 California street, San Francisco, California.

DELINQUENT SALE NOTICE.

MAYDAY GOLD AND SILVER MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Calaveras County, California.

Notice.—There are delinquent upon the following described stock, on account of assessment (No. 6) levied on the 10th day of July, 1902, the several amounts set opposite the names of the respective shareholders, as follows:

Names.	No. Shares.	Am't.
J. P. E. Helntz.....	126	\$ 8.75
O. G. Ven Treutler.....	127	400
George Schoenwald.....	131	100
Frank Weeks.....	133	500
J. P. E. Helntz.....	135	200
A. A. Archer.....	147	100
Duncan S. Hayne.....	157	1,000
Duncan S. Hayne.....	164	250
A. Feist.....	165	1,250
A. Bowdler.....	168	500
Edith A. E. Lyman.....	171	100
Charlotte H. Wright.....	172	100
Edmunds Lyman.....	173	50
Malcolm Moulder.....	174	50

And in accordance with law, and an order from the Board of Directors, on the 10th day of July, 1902, so many shares of each parcel of such stock as may be necessary, will be sold at public auction, at the office of the company, at Head's Business College, 24 Post street, San Francisco, California, on THURSDAY, the 15th day of September, 1902, at the hour of 1 o'clock P. M. of said day, to pay said delinquent assessment thereon, together with costs of advertising and expenses of sale.

EDWARD H. STEARNS, Secretary.

Office of the Company—Head's Business College, 24 Post street, San Francisco, California.

THE CALIFORNIA DEBRIS COMMISSION having received applications to mine by the hydraulic process from Stockton Gravel Mining Co., a Philadelphia, Pa. Co., to mine at Feather River, Calif., to deposit tailings in Eagle Creek drainage into Stanislaus River; from Manuel Leal, in South Honcut Mine, near Bangor, Butte County, Cal., to deposit tailings in South Honcut Creek, draining into Feather River; from John Solari and Rocco Molinari, in Marble Canyon, near Colusa, Colusa County, Cal., to deposit tailings in Sutter Creek drainage into Sacramento River; from C. C. Beaver, in Union Mine, at Brownsville, Yuba County, Cal., to deposit tailings in Dry Creek drainage into Yuba River; from Dardanelles Consolidated Gravel Mining Co., in Dardanelles and Oro Mine at Forest Hill, Butte County, Cal., to deposit tailings in Dardanelles Canyon, draining into Middle Fork of American River; and from Thomas & Bayliss, in Gold Run Placer Mine, at Elizabethtown, Plumas County, Cal., to deposit tailings in Spanish Creek drainage into Feather River; give notice that a meeting will be held at room 16 Flood Building, San Francisco, Cal., on September 15, 1902, at 1:30 P. M.

CHICAGO SCHOOL OF ASSAYING.

Courses in Assaying and Ore Testing. Courses in Chemical and Metallurgical Analysis. Courses for Miners and Prospectors. Instruction individual. Enter any time. Open evenings. J. DUNRYEN YOUNG, Director, 1733 Monadnock Building.

SITUATIONS WANTED.

WANTED.—Employment as assistant assayer. Address K. G. A., care of this office.

A mining engineer with thorough technical and business training and 12 years experience as manager, superintendent and engineer, proficient in Spanish, wants position with reliable parties. References furnished. Address "Cedres," this office.

MASTER MECHANIC. First class, wants a position with mining company in Ariz. or Mex. Wide experience in all kinds of mining and milling machinery. Reference furnished. Address "Master Mechanic," care Mining and Scientific Press.

Experienced Copper Metallurgist and Mining Engineer will equip, manage or expert such properties. Address Cu, Mining and Scientific Press.

Consulting Mining Engineer, familiar with making examinations of mines, prospects and mineral lands, would like a position with reliable parties. Best references. Address S. A., care of this office.

WANTED.—An all-round miner wants position as foreman. Over 24 years' experience in practical mining and handling men. Best of reference. Address Call Box 29, Weiser, Idaho.

WANTED.—Employment at mine by young, experienced Assayer, Surveyor and Bookkeeper. References. Address A. H., care of this office.

COMPETENT SUPERINTENDENT wants position in California; 15 years' experience in running mines, mills and smelters for profit, and managing men. College bred and technically educated. Formerly held positions as assayer, mining engineer, accountant, superintendent, and manager. Member A. I. M. E. High testimonials. Address "Superintendent," Box 513, Seattle, Wash.

Cyanide and Stamp Mill Superintendent open for engagement. Graduate, thorough assayer and chemist; also accountant. Speaks Spanish. Will go anywhere. Specialty, construction; also successful treatment of low-grade and slimy ores. References "A1." Address PRACTICAL, care of MINING AND SCIENTIFIC PRESS.

ASSAYER AND MILLMAN will be open for engagement after Oct. 1st; has been employed for past two years in one of the largest modern amalgamating and concentrating mills in Colorado; had seventeen years experience in assaying or millwork, seven of which was in a Government Mint. Correspondence solicited with reliable parties only. Address R. S. B., care of Mining and Scientific Press, 606 Mack Block, Denver, Colo.

WANTED.

WANTED.—BY TWO ENERGETIC AND EXPERIENCED mining men the acquaintance of persons interested in the development of mining property in old Mexico. Address D. L. C., care of this office.

Wanted to Bond a Dry Placer Claim, One Rich in 'Flour' Gold.

Must be a dry proposition. Address "Placer Claim," care of this office.

WANTED.

ENGINEERS, MACHINE DRILL MEN AND TOOL SHARPENERS.

Address QUARTZ MINE, care MINING AND SCIENTIFIC PRESS.

WANTED—A MACHINIST.

A good all round man to go to Mexico to take care of silver mill, etc. One who understands Spanish preferred. Address K. C. B., care MINING AND SCIENTIFIC PRESS.

FOR SALE.

FOR SALE.

A Complete Hoisting Plant,

with Gates 50 H. P. Hoisting Engine and two 4-foot 3-inch x 3-foot 6-inch Steel Cages; located at Keystone, S. Dak.

Address THE ELIZABETH MINING CO., 601 Herman Bldg., Milwaukee, Wisconsin.

FOR SALE.

A Complete 40-Stamp Mill,

with No. 3 Gates Crusher, forty-850-pound Stamps, forty-eight Silver Plated Copper Plates, 3 feet x 4 feet 6 inches, and sixteen Wilfley Concentrators. Power for this plant is furnished by three 66-inch x 16-foot Boilers, in connection with one 14x26 and one 16x30 Atlas Engine.

Mill located at Keystone, S. Dak.

Address THE ELIZABETH MINING CO., 601 Herman Bldg., Milwaukee, Wisconsin.

The Mines Exchange, Ltd.

Mines and prospects in British Columbia; the Western States, and Mexico, for sale. Free milling gold properties a specialty. Write us for reports and information. Bank references given.

Address THE MINES EXCHANGE, LTD., P. O. Box 700, Nelson, B. C.

Branch Office: P. O. Box 594, Salmon City, Idaho.

Quicksilver

BY THE FLASK OR CARLOAD.

WEIGHT AND QUALITY GUARANTEED.

The Eureka Company, OF SAN FRANCISCO.

320 SANSOME STREET, SAN FRANCISCO.

Quicksilver

IN LOTS TO SUIT.

Write for Quotations.

REDINGTON & CO., 23-25-27 Second Street,

SAN FRANCISCO, CAL.

MINING AND SCIENTIFIC PRESS

Whole No. 2198.—VOLUME LXXXV.
Number 10.

SAN FRANCISCO, CAL., SATURDAY, SEPTEMBER 6, 1902.

THREE DOLLARS PER ANNUM.
Single Copies, Ten Cents.

Mining Exhibits at San Francisco, Cal.

Of late years it is the custom, more and more, for conventions of the different fraternal orders in the United States to hold meetings at San Francisco, and with a view to advertising the resources of California displays of different counties have been at times on view in the spacious nave of the Union Depot, at a point where all the thronging thousands arrive and depart.

The last occasion of this sort was in August, 1902, when the "Knights of Pythias" came in conclave, opportunity being given to examine some of the things that are produced on the Pacific coast. There were several fine mineral displays, among them being one from Nevada county, Cal. Through the courtesy of Mr. Samuel Butler of Grass Valley was received a photograph of the display made by that county, an engraving of which herewith appears.

The State of Nevada was also well represented. The exhibition was in charge of G. W. Ingalls, who furnished the photograph from which the accompanying halftone was engraved.

It has been calculated that 150,000 people visited the display during the week it lasted, making it a good advertisement. A permanent exhibit would be a paying investment.

South African Mining Conditions.

There is naturally much present objection on the part of Rand mine owners to the 10% tax announced by the British government and the question is asked, "Wherein do we benefit by the cessation of Boer dominion?" Still, as the mines were the cause of the costly Boer war they must expect to hear some of the hurden. To add to the troubles of the South African mine owner is now announced the ever-present labor trouble. The Kaffir is content with a little, but sees no reason why he should work for the white man at low wages, especially since the license of war times when he learned how to handle a gun and forage on the country.

The mines need 75,000 men and can get but 5000. The dependence for unskilled labor is mainly the native negro, for the Boer is no miner, will not learn to be, while the offer of \$1.25 per day "and found"

to the British soldier is not at all alluring. The negroes are offered about \$9 per month and their keep, but like all such labor, it is cheap only in name; one American miner is worth twenty of those fellows. British empire builders dream of making South Africa a white man's country and aim to induce a quarter million men to go from the overcrowded home country to the new world found there. The idea is commendable in the main, and will ultimately prevail, but just now the demand is for miners.

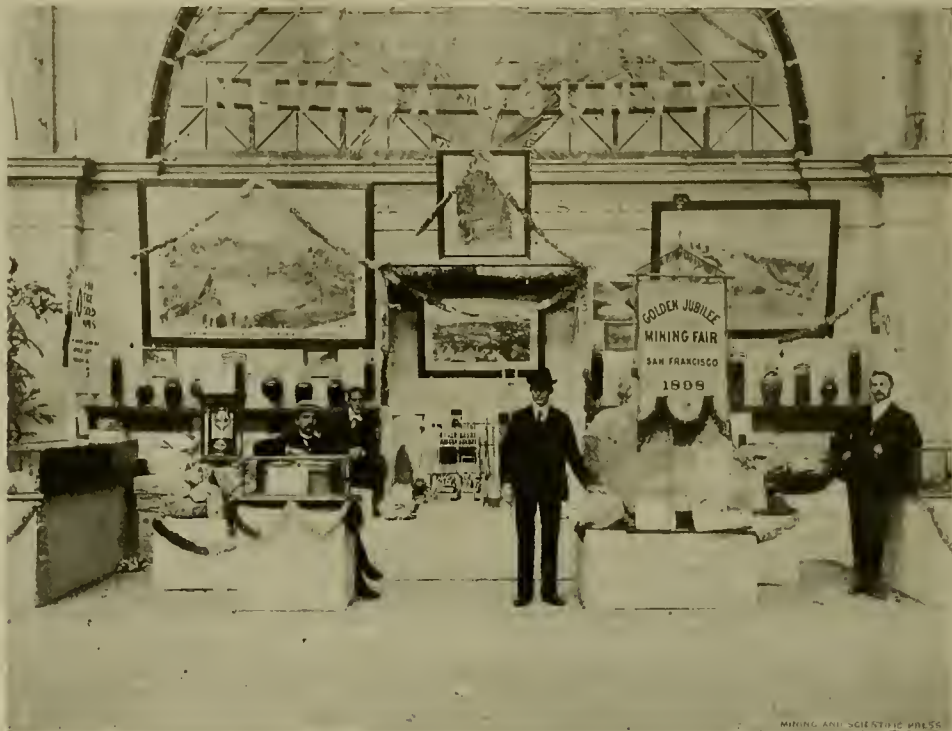
The matter is referred to here for the purpose of saying that no American miner should think of going to South Africa unless under contract at good salary for a definite time with a responsible company. Anywhere in this country an American miner can

make his way and get to the front by the exercise of the same homely qualities that win success, but if he starts at the bottom in South Africa he'll have to stay there. The only way to win there is to start at the top and have sufficient ability and merit to hold that place. The conditions are against subsequent advancement. Hence, for a variety of reasons that must be manifest upon a little reflection, it were not advisable for a miner from this west half of America to take many chances in looking for spot lucrative employment in South Africa. The odds are against him from the start.

South African mines have paid large salaries to American miners and will continue to, not because they are American, but because they possess the technical and executive ability that justify such salaries, but those salaries are all arranged beforehand, and a man going there knows just what he is to get. Even then they get back to the United States at the first decent opportunity, for they naturally chafe at the rigid conditions so foreign and irksome to a man where one counts for so much as he does here.

So far as miners from this country are concerned, there isn't much change from previous conditions, and our advice to any one without a contract, but thinking of going to South Africa "looking for a job," is to have a good talk with some one who has been there, and if he does conclude to try it to go with his eyes open and not expect too much.

A CONTEMPORARY promulgates the belief that with greater depth the Cripple Creek, Colo., mines will show less and less gold, and that the gold values will disappear at a depth of 1500 feet. Neither fact nor theory will bear out this assumption. Even that heter sort of theory that follows fact instead of preceding theory, the kind of theory that is founded on fact, negatives the idea. This week's report from the El Paso mine, Poverty gulch, Cripple Creek district, gives as more likely fair indication of permanence and continuity as depth is attained, the ore at the 850-foot level being a sulphide combination showing considerable free gold. In Cripple Creek, as elsewhere, the character of the ore is changing as it goes down, but the indications are of a nature favoring belief that the tellurides changing to a sulphide base argue for continuance.



Nevada Co.'s, Cal., Mineral Display at the Union Depot, San Francisco, Cal., August, 1902.



The State of Nevada's Mineral Display at the Union Depot, San Francisco, Cal., August, 1902.

MINING AND SCIENTIFIC PRESS.

ESTABLISHED 1860.

Published Every Saturday at 350 Market St., San Francisco, Cal.
TELEPHONE, DAVIS 771.

ANNUAL SUBSCRIPTION:

United States, Mexico and Canada.....\$3 00
All Other Countries in the Postal Union..... 5 00

Entered at the San Francisco Postoffice as second-class mail matter.

Chicago Office (Telephone, Harrison 73).....737 Monadnock Block.
Denver Office (Telephone, Olive 733).....606 Mack Block.

J. F. HALLORAN.....Publisher.

San Francisco, September 6, 1902.

TABLE OF CONTENTS.

ILLUSTRATIONS.—Nevada Co.'s Cal., Mineral Display at the Union Depot, San Francisco, Cal., August, 1902; The State of Nevada's Mineral Display, Union Depot, 124. The Eames Motor-ette; Double English Cupelling Furnace, 128. Scene in the Sierra Sequoia Before Lumbering Began; Scene in the Same Forest After Wasteful Lumbering Operations, 132. Mining and Metallurgical Patents, 133.

EDITORIAL.—Mining Exhibits at San Francisco, Cal.; South African Mining Conditions; Less Gold With Greater Depth, 124. Long-Distance Electrical Transmission Enterprises; Zinc Reduction Works at Butte, Mont.; A Detering Factor in Deep Mining; An Interesting Report; Technology of Copper Mining; The Question of Mine Taxation; Replacement of Machinery; "Standardizing" Catalogues, 125.

MINING SUMMARY.—134-135-136-137-138.

LATEST MARKET REPORTS.—17.

MISCELLANEOUS.—Concentrates, 126. Treatment of Slimes by Filter Presses; Need of Good Roads; Topographic Survey of Northern and Central California; Triangulation of Western Montana Forest Reserve Completed; A Decade of Mineral and Mining Returns; Notable Electrical Progress, 127. The Eames Motor-ette; Production of Copper; Effect of Oil Fuel on Boilers; Double Cupelling Furnace, 128. Road Grades; Utilizing Water Flow; Some Main Requirements; Current Required by Motors, 129. Examining Mines; Arid Lands of the United States; A Utah Sampling Works, 130. The Recovery of Arsenic From Ores and Metallurgical By-Products; By-Products From Rand Cyanide Works, 131. Save the Forest—Cost of Mineral Surveys in Arizona; With a Grain of Salt, 132. Mining and Metallurgical Patents; "Ancient River Channels," 133. Personal; Commercial Paragraphs; New Patents; Notices of Recent Patents; Catalogues Received; Recently Declared Mining Dividends; Obituary, 129.

WHILE California and Utah excel in great long-distance electrical transmission enterprises, the Middle West affords the most advanced present example of artificial water ways. Four years' work and the expenditure of \$5,000,000 have successfully completed the Sault Ste. Marie water power canal, 224 feet average width, 22 feet deep, 2½ miles long. At the entrance it is 391 feet wide, 18 feet deep, with an estimated flow of 30,000 cubic feet per second. In the power house 320 turbines develop 40,000 indicated horse power. There are eighty dynamos in the electrical equipment, "harnessing" Lake Superior.

BUTTE, MONT., is considering zinc reduction works to treat the great quantity of zinc ore now being profitlessly produced in that district. Treatment of those ores is ordinarily precluded because of less fusibility on the part of the slag, and the choking effect in the ordinary smelter. Even in the ordinary zinc distillation furnace, the marmatite of Butte contains such a percentage of iron and lead as to corrode the retorts, while the Canyon City or Denver, Colo., magnetic processes, so successful with Leadville zinc ores, have not so far made successful commercial return thereon. The Butte zinc ores run from 16% to 30% iron, 2% to 12% lead, 2% to 10% silica, 16% to 35% zinc, 5 to 15 ounces silver and \$1 to \$5 gold.

HEAT generated by oxidization is often a deterring or determining factor in deep mining. In sundry localities at various times it has been noted that the increase in temperature with depth was not regular, being subject to the amount of pyrites in the ground, or to the time that drives in which the temperature was noted had been opened up. In one case at Sandhurst, Victoria, N. S. W., a fall of 5° F. in temperature was noted after the ground had been opened up for one year, and after four years had elapsed there was a further fall and then an unchanged temperature. At a depth of 1700 feet in the Comstock, Nevada, boiling hot water was found, and the statement was then made that a little further down all matter was molten, yet on passing the 2000-foot level

the temperature decreased, the Union shaft at a depth of 3300 feet having a more comfortable temperature than could be found half way to the surface. These local conditions are well exemplified in the Lake Superior region, where there appears to be a local cold zone, the temperature in the Calumet & Hecla shaft at 4700 feet being 79° F., only 20° warmer than at a depth of 100 feet.

THE Broken Hill Proprietary Co., New South Wales, always furnishes an interesting report. For the half year ending May 31, 1902, General Manager Delprat shows that the desulphurization of slimes by roasting there is of sufficient value to warrant extensive operation. Complaint is made of the onerous tax, as in the case of British Columbia, being even "more than the traffic will bear," there being a 50% duty on the f. o. b. value of the imported Oregon pine for timbering. Still there was a gross profit for the half year of £68,236 16s. 10d., which deducting £20,295 4s. 9d. for depreciation, leaves a net six months profit of £47,941 12s. 1d. The output of silver was 2,554,169 ounces fine; lead, 32,289 tons; gold, 13,350 ounces; copper, 13 tons. The saving in the working costs is about balanced by the reduction in value of the company's products.

THE technology of copper mining is simpler than it was a dozen years ago, and better understood by miners. The business of copper mining—the commercial side of the mining—is, however, more complex than a dozen years ago, and (if the diverse opinions published concerning it are to be accepted) less understood than it was then. There is an intimate connection between the better understanding of the technical part of copper mining and the more apparent misunderstanding of the commercial part of copper mining. Copper is obtained from two classes of ores; one, in which copper is the only value recovered; the other, in which copper, silver and gold, with or without lead and zinc, are recovered as commercial values. The first class is practically limited to Lake Superior native copper ores, the little silver the copper carries just paying its cost of electrolytic parting. The second class includes the oxide and sulphide ores mined in Montana, Arizona, California, and nearly everywhere else that copper is produced. The first class, which a few years back furnished the larger part of the world's copper production, now furnishes the lesser part by reason of the increased production from the ores of the other class. The total amount of copper obtained from the Lake Superior ores bears a direct relation to the sale price of the metal. When the price is high, ores containing a less quantity of copper are mined than when the price is low. The total amount of copper obtained from ores of the second class is not so directly affected by the sale price of the metal. Much depends on the other recoverable values. They pay, in any event, part of the cost of the production of the copper; they may pay all its cost, or they may pay the cost of the copper production and a profit additional. Some mines commonly spoken of as copper mines, are really gold mines or silver mines.

THE question of mine taxation is an ever present one and a fruitful topic for discussion. British Columbia is making present effort to evade or abrogate the crushing burden of taxation. With mistaken zeal in the race for revenue, tax gatherers often treat tax creators unjustly, and tend to destroy some good sources. Recently this paper, in the course of some homely suggestions, said that a U. S. patent was of ironclad potency in mine titles, and that in case of a desired sale the possession of a U. S. patent to the property was always a help. In the usual letters subsequently received from various mining points, the idea was plainly brought out that while all conceded the value of a U. S. patent should a sale be desired, yet in many instances the owner of a mining claim deferred securing a U. S. patent to his property because of an inevitable increase in tax rate thereon in his locality as soon as the patent was secured. Regarding the point brought out in the editorial referred to, that the tax valuation of \$100 on unpatented mining claims in the United States was arbitrary and unwarranted, statement comes

from more than one California county that even on an unpatented claim the owner sometimes hesitates to sink a shaft to prospect because the prospecting hole is taxed what it costs to sink it. It is ridiculous that money paid to labor should be taxed to the man who employs labor. It is manifest even to a county assessor that a mine's value is not to be fairly determined by what it costs to prospect it. As a matter of business, the expense of improving, developing, opening up a mine, should be exempt from taxation. Miners don't object to taxation, but they do rightly object to be made special subjects for the taxgatherer. The matter has intimate connection with preliminary making of a mine, and is one of the things that sometimes tend to keep back the creation of wealth and greater opportunity for taxation in districts now undeveloped.

Replacement of Machinery.

Mention has been made in the last few months of the rapid advance in mining and scientific matters that often make books thereon somewhat behind the times when issued from the press. This rapid advance has also the commercial effect of rapid and enormous depreciation in the value of a comparatively new plant. In several notable instances the right kind of economy has dictated relegating to the junk shop a lot of costly machinery. But a few months ago, according to an electrical contemporary, "the New York Telephone Co. calmly and deliberately dumped \$400,000 worth of telephone apparatus into the scrap heap and started at Cortlandt street a new exchange in place of the old one, in order to increase the efficiency of its service. The salvage from the old hoard and the old subscribers' equipment is far too small to be mentioned. The equipment is still in sound working order, and is replaced simply because a better system has been invented. At the time the old switchboard was huilt it was the largest metallic circuit multiple switchboard in the world, and was equipped for 6000 lines."

This is a notable case in point. Another fell under the writer's personal observation during a recent visit to Pittsburg, where in one establishment he saw \$300,000 worth of fine machinery thrown out, just because the owners knew of better machinery that would make money sufficiently faster to justify the apparent recklessness. The idea now is to work a machine to death, for the likelihood is that long before it is worn out some better device will be substituted, and if a concern does not keep up with its competitors it must go to the wall. 'Tis a daring race, and one that requires nerve to sit steady.

In mining—particularly in gold mining—such need of extravagant economy does not exist in so marked a degree, yet even in the domain of mining and metallurgy a comparison of a catalogue of 1882, 1892 and 1902 shows how ancient some former mining appliances now appear.

"Standardizing" Catalogues.

In the issue of August 16th appeared an editorial paragraph on the suggested "standardization" of catalogues as to size, setting forth some reasons for the idea, and recommending that 6x9 inches be chosen by progressive machinery manufacturers and dealers. In the issue of August 21st of Engineering News the leading editorial is devoted to the same suggestion, and one paragraph therefrom is deemed worthy of reproduction. Our Eastern contemporary, in recommending the 6x9-inch size, says: "When a firm has invested thousands of dollars, more or less, in publishing a catalogue, it is manifestly for its interest to have that catalogue made use of by its customers and not thrown away or stowed in some obscure corner where it will be forgotten. Yet when such a firm permits the manager of its publication department, or its printer, or whoever has charge of the matter, to make a catalogue of some odd size, perhaps too high to stand on an ordinary shelf or of greater width than height, so that it refuses to go with others in a proper classification—when it commits such a piece of folly, it is deliberately consigning a large percentage of these expensive catalogues to the waste-basket or to the top shelf where they will be forgotten."

Concentrates.

IN Colorado a prospector is debarred from entering upon a patented placer claim with intent to find a lode.

At a temperature of 50° F., a cubic foot of compressed air on the surface of the earth will weigh 536 grains.

THE 83rd meeting of the American Institute of Mining Engineers will be held at New Haven, Conn., beginning Oct. 14, 1902.

By way of variety, the hoary term "fissure vein" might be styled an "ore break," the latter being further defined as "a break in the rock, accompanied by ore."

It is manifestly impossible to correctly quote current values of rare earths. So much depends on attendant circumstances. Didymium is worth about \$7 per ounce, cerium \$7.50, lanthanum \$40.

It has been calculated that since 1870 the cost of gold production in general has fallen 60%. Meanwhile the refined product is still worth what it was when it cost twice as much to mine gold as it does now.

THERE is no such distance as a "knot." The distance between two "knots" on a logline is 6082 feet. The term "knot" is correctly used only in connection with time; a mile is a mile, regardless of anything else.

THE present United States tariff levies a duty of 12½% on cyanide of potassium. The ordinary duty on chemical salts is 25%. Some of the imported article is far from pure, being a mixture of potassium and sodium cyanides.

"CONCENTRATES" does not know of any authenticated case where only a part of the charge of giant powder in the hole exploded, leaving a part of the same charge unexploded, and which was subsequently set off.

TO PREPARE resin for soldering bright tin, mix 1½ pounds of olive oil, 1½ pounds of tallow and 12 ounces of pulverized resin, and let them boil up. When this mixture has become cool add 1½ pints of water saturated with pulverized sal-ammoniac, stirring constantly.

ORDINARY dynamite is made up of 75% nitro-glycerine, 25% infusorial earth; duallene contains 80% nitro-glycerine, 20% nitro-cellulose; rend-rock has 40% nitro-glycerine, 4½% nitrate of potash, 13% cellulose, 7% paraffine; giant powder, 36% nitro-glycerine, 48% nitrate of potash, 8% sulphur, 8% resin or charcoal.

IN the case of Smith vs. Jones et al., as reported in 60 Pac. Rep., Utah, 1104, it was held that the surface of mineral lands may be owned by one person and the mineral underneath by another, each with an indefeasible title, and that, when so owned, they constitute separate corporeal ownership, and the surface land might be partitioned the same as where there is no mineral under it.

"QUARTATION," referred to in the issue of Aug. 2, is a term used by assayers in acid parting of gold and silver. It was originally thought that the proper proportion for parting was three parts silver to one of gold; hence the name "quartation" given to the process. Experience has shown, however, that a lesser proportion of silver is quite as effective, and that the copper may be considered as silver for parting purposes.

THE mean effective pressure and the average pressure shown by an indicator diagram are never the same, and never can be except in the case of a condensing engine in the exhaust pipe of which there is a perfect vacuum, and that has never been attained. It is doubtful if it would pay to run an engine under such conditions, for the same reason that it does not pay to run a non-condensing automatic engine with a very short cut off.

ACCIDENTS to miners from picking out mined shots might be greatly obviated by not filling to the brim with tamping. It should not be necessary to pick out any holes if loaded in this way: Tamp in first powder put in moderately with a stick; then put in a cap and fuse; put balance of powder on cap and tamp lightly. If an upper use a little paper on top of all. The tendency of giant is down and out, not down and up. Holes thus loaded will break to the bottom and as well as when filled to the brim with tamping.

THE Canadian Dominion Government authorizes the payment of bounties on lead refined in Canada from materials produced in Canadian smelters from Canadian lead ore. On every ton of lead so refined during the calendar year 1902, \$5; on every ton of lead so refined during 1903, \$4; on every ton of lead so refined during 1904, \$3; on every ton of lead so refined during 1905, \$2; on every ton of lead so refined during 1906, \$1; the bounties payable half-yearly on the first days of July and January in each year; the total sum payable for such bounties not to exceed \$100,000 in any year.

IF gold and copper are melted together in any proportion and thoroughly mixed while fluid, the resulting bar or ingot will be uniform throughout in composition. But when silver is alloyed with copper only one proportion is known which will give a uniform casting. This proportion is 72% silver to 28% copper. With more silver than 72% the center of a cast bar will be richer than the outside, which chills first; while with a less percentage than 72% the center of the bar will be poorer and the outside richer than the average. This characteristic of silver-copper alloys is known to metallurgists as "segregation."

THE successful treatment of gold and silver ore by the cyanide process depends entirely upon the nature of the ore itself. Very satisfactory results have been obtained by coarse crushing without concentrating of ores with the values contained in the oxidized iron pyrites. It is doubtful if the ore will yield to successful treatment in raw condition if the sulphides are not in their natural state. A careful examination of the ore and tests would be the only way of treating each specific case. If the ore contained in excess of 1% of copper or any antimonial sulphides, or zinc, it would not be profitable to attempt the cyanide process for the extraction of the precious metals.

To remove rust from polished steel cyanide of potash is excellent. Soak, if possible, the instrument to be cleaned in a solution of cyanide of potassium in the proportion of one ounce of cyanide to four ounces water. Allow this to act till all loose rust is removed, and then polish with cyanide soap. The latter is made as follows: Potassium cyanide, precipitated chalk, white castile soap. Make a saturated solution of the cyanide and add chalk sufficient to make a creamy paste. Add the soap cut in fine shavings and thoroughly incorporate in a mortar. When the mixture is stiff cease to add the soap. It should be remembered that potassium cyanide is a virulent poison.

IF the owner of a mine contracts with the owner of an adjoining claim to extend its workings into such claim, for a stipulated price, for the purpose of exploiting and developing the property, and it be agreed that, should any marketable ore be taken therefrom in the course of such development, the first mentioned would sell the same and account to the second mentioned for the proceeds; the first mentioned is not prohibited by such contract from claiming the proceeds of ore so removed and sold as his own, where, in making the development, he discovered that the vein from which he took such ore had its apex within the lines of his own claim, and the ore was, therefore, his own property.

SILVER alloys with bismuth in all proportions, and the latter metal may even be employed instead of lead for cupellation, though the process is then much slower, and the loss of silver is ordinarily greater than when lead is used. The affinity of zinc for silver is so great that the former metal at a temperature a little above its melting point will remove silver from its alloy with lead. When silver is plunged into mercury there is produced at the surface of the metal a very thin layer of amalgam, which arrests the ulterior action of the mercury. This is the reason why grinding is so necessary in the amalgamation of silver ores, because the adherent film of amalgam is removed by friction, and fresh surfaces of silver are exposed to the mercury.

THE Wetherill magnetic separator has been applied successfully at Kalk-A-Rhein, Germany, in the separation of an ore containing galena, zinc, blende and spathic iron, carrying 12% of manganese, with a gangue of quartz. By ordinary mechanical concentration there could only be obtained an impure spathic iron, containing 15% to 22% of zinc and about 2½% of quartz. Using the Wetherill separator, the ore being crushed not to exceed 3 millimeters diameter, the blende concentrates showed 42% to 46% zinc, and the spathic iron, obtained as a separate product, carried only 1% to 3% of zinc. The tension of the current was 65 volts, with 12 amperes. Each machine, with belts 14 inches wide, traveling 125 feet per second, was capable of treating a little over one ton per hour, at a cost of 29 cents per ton.

REGARDING the use of charcoal in the cyanide process, it had been found that the finely divided particles of charcoal passed through the filter and the solution became injuriously affected for future use. The difficulty was subsequently overcome by placing upon the perforated bottom of the tank holding the solution a thick canvas cloth held in position by a flat iron ring closely fitting the angle formed by the bottom and side of the tank and this ring secured in its place by lugs and keys or screws, the tank having a double bottom and the space between the false and true bottoms being partially exhausted by an air pump, this mode tending to cause a steady and easily regulated flow of the solution through the canvas, but preventing the passage of the fine charcoal particles which remain in the tank on the canvas. The same result is reported effected, preferably, by placing a tightly fitting cover on the tank and forcing air in the space between the surface of the solution and the cover.

AT Rossland, B. C., to transport the ore from the main shaft to the shipping bins at the railroad, the War Eagle employs a double track gravity tram. This tram is set for nearly its whole length on a trestle, not to save grading, but to escape the snowfall. The tram has a fall of 350 feet in a total length of 1300 feet, and in profile has a concave and convex curve. The rope is kept down on the concave side by a pulley in an overhead frame, and kept up on the convex curve by a sheave of 4 feet diameter set between the tracks. The tram car holds five tons of ore, and is dumped automatically at the lower end of the tram. This end of the tramway is movable, and can be so swung that the end is over the bin into which the ore should be dumped. The tramway at the Le Rol is an aerial one, about 2000 feet long. One man only is employed at the loading end. At the other end the buckets drop their ore into the bins automatically. From the bins the ore runs into the cars below through iron chutes, the gates of which are worked by compressed air cylinders.

IF leaks develop in gaskets the bolts holding same should be tightened; if in seams or rivets, so that the water squirts out, the pressure should be dropped to not exceed 50 pounds for high pressure boilers or 25 pounds for tubular boilers, and then the bad places calked with the proper tools. It will do no hurt and is even safer to let the pressure off almost entirely before calking, and this is especially desirable if there are several leaks or continuous leaks in seams. It should never be attempted to calk a boiler under full water pressure, as the boiler is then under heavy strain, and, being full of water, is especially rigid, and a sharp blow may start serious leaks in several places at once. Raise the pressure again, watching the seams as before, and repeat the operation until the pressure is raised to about 50% above the regular steam pressure at which it is to operate, without having any metal-to-metal joints running or squirting water. A small seep or sweat is allowable, as these places will close up as soon as the boiler is heated. All this is really the business of the boiler erector; but sometimes the engineer in charge is supposed to do all this himself.

THERE are two methods of refining platinum ore. One is known as the Wollaston. In this, after removal of the metals associated with platinum by the successive action of nitric and hydrochloric acids, the platinum itself is dissolved in aqua regia, from which it is precipitated by a solution of sal ammoniac in the form of a sparingly soluble double salt (ammonium platino-chloride). This salt is washed and heated to redness, by which the chlorine and ammonia are expelled, leaving the metal in the form of a gray spongy soft mass, known to chemists as spongy platinum. In this form platinum can not be fused into a compact form by ordinary furnace heat, but, like iron, it can be welded at a high temperature. Accordingly, it is made into a thin paste with water, then introduced into a brass mold and subjected to a graduated pressure, by which the water is squeezed out and the mass rendered sufficiently firm to bear handling. It is then dried, very carefully heated to whiteness and hammered or subjected to powerful pressure. The Deville-Debray method: This is a very simple furnace. Two flat pieces of quicklime are scooped out, representing two cupels, and form the bottom and the lid of the furnace. The lower cupel has a notch cut in its side to serve as an exit for the liquefied platinum. The upper one is pierced at its center with a slightly conical round hole, through which the platinum nozzle of an oxyhydrogen blowpipe enters, so that the flame beats down on the metal within.

EXHAUST STEAM when at atmospheric pressure has a temperature of 212° F., and yields its latent heat upon being condensed. Open heaters using exhaust steam are capable of raising the temperature of the feed water to about 200° when properly proportioned to the work, besides removing a considerable amount of the impurities in the water before it enters the boiler, which prevents the formation of scale to a greater or less extent, principally the heavier but softer formations. The heat in the gases escaping to the chimney may be utilized in what are known as economizers. These are nests of pipes arranged close together in the smoke flue between the boiler and the chimney. The smoke and hot gases pass between and around the pipes while the feed water is forced through them before entering the boiler, thus abstracting a large percentage of the total number of heat units in the gases which would otherwise be wasted. The feed water should enter the economizer at a point farthest from the boiler, or where the hot gases enter the economizer. It then flows through the pipes in the opposite direction to the current of hot water, and consequently comes in contact with the hottest gases just before entering the boiler, and at this point the temperature will be found to be above 212°, or the boiling point at atmospheric pressure. If the feed water is first heated in a closed exhaust steam heater before it enters the economizer it is possible to raise the temperature nearly to that of the steam in the boiler when under considerable pressure.

TO GRIND a stop cock of any kind, first see that the plug fits the barrel before it is taken from the lathe. Run a half-round smooth file up and down the barrel to break any rings that may be in it; a few rubs of a smooth file back and forth over the plug will break any rings or tool marks on it. Wipe both parts clean. Use for grinding material fine molders' sand sifted through a fine sieve. Mix with water, in a cup, and apply a small quantity to the parts that bear the hardest. Turn rapidly, pressing gently every few turns; if the work is large and the lathe is used, run slowly; press and pull back rapidly to prevent sticking and ringing; apply grinding sand and water until a bearing shows on another part, then use no more new sand, but spread the old that has worked out over the whole surface. Turn rapidly, pressing gently while turning; withdraw the plug and wipe part of the dirt off, and rub on the place a little brown soap; moisten with water and press the surfaces together with all the force at hand, turning at the same time. Remove the plug and wipe both parts clean; next try the condition of the bearing by pressing the dry surfaces together with great force. If the parts have been kept together closely while grinding, and the plug has not rubbed against the lower part of the barrel, the surfaces will be found bright all over and a perfect bearing obtained. If an iron barrel and brass plug are used, or two kinds of brass, a hard and soft metal, soap should be used freely when finishing up, as the tendency to form rings is greater when two different metals are used.

Treatment of Slimes by Filter Presses.*

By CLEMENT DIXON.

A filter press consists of a number of hollow frames (from 30 to 50 in a six-ton press according to depth of chambers used) placed alternately between solid flanged plates, with filter cloths of strong duck material between each. The hollow frames—in a six-ton press—would be 3 feet 6 inches or 4 feet square inside and 2, 3 or 4 inches in depth or thickness, as required for the particular ore treated. It will thus be seen that in reality we have a number of little vats standing on end—the hollow frames forming the sides and the solid plates and filter cloths the bottoms. Each of the hollow frames (which receive the slimes) is connected by a slot with the slimes inlet passage, and every alternate solid plate is connected by a slot with the wash solution inlet passage; these solid flanged plates act as filter bottoms for admitting wash solutions to the slimes cakes. The remaining solid plates are connected with the wash solution outlet passage, and serve to carry away the wash solution after it has passed through the slimes cakes. Again, on each of the solid flanged plates is a cock used for draining the press when filling same with slimes. In establishing the filter press on a slimes works, the first and most important detail is to determine by experiments what thickness of slimes cakes to make, or, in other words, what is the best depth to have your hollow frames so as to ensure that your cakes will be uniformly permeable to wash solutions; this thickness, of course, depends on the nature of the ore and fineness of crushing, etc. Probably a 3-inch cake will not be found too thick for the majority of slimes on these fields.

One six-ton press will hold six tons dry slimes and about three tons moisture, and as the press could be re-charged, say every two hours, it will be seen that each machine (of this size) has a capacity of from sixty to seventy tons of dry slimes in twenty-four hours. There are two principal methods of dealing with slimes in filter presses—(1) The slimes (separated from the sands by means of spitzlütten and afterwards settled in V boxes and settling vats) are agitated with weak cyanide solution of the required strength, and as soon as the solution of gold is complete (commercially) the pulp is forced into the presses to separate the gold-bearing solution from the slimes; then weak wash solution or water is forced through the cakes to displace the remaining gold-bearing solution. (2) The solution of the gold may be effected entirely in the filter presses (without previous agitation with KCy solution) by first charging the press with slimes and then forcing cyanide solution through the slimes cakes until the highest commercial extraction of the gold is obtained, then displace gold solution by weak wash or water. Both these methods are in use in Western Australia, but the choice must be determined here, as elsewhere, by experiment. No. 1 method is the one adopted, with every success, by the largest reduction works in New Zealand.

If No. 1 method were adopted, the process would be conducted as follows: As in the decantation process, it is essential to separate as much water as possible from the slimes in order to reduce the bulk of solution, ergo consumption of KCy, to a minimum. The thick pulp is then transferred from the settling vat by means of a pump or by gravitation, if possible, to agitators, and sufficient weak cyanide solution added to bring the proportion of solution up to 1.5 to 1 of dry slimes. After the solution of the gold is complete (commercially) the slimes are run into a small pneumatic forcing receiver, and by means of compressed air, supplied from an accumulator at, say, seventy pounds pressure—a steady flow of pulp is forced into the hollow chambers of the press. During the process of filling, the gold-bearing solution escapes from cocks along one side of the press into a launder and flows into an intermediate gold solution vat and from thence into the precipitation boxes. As soon as the press is full of slimes these leaching cocks (of the press) stop running. The cocks are then closed and wash water or weak wash solution is forced into the press at the inlet plates—at, say, from 90 to 100 pounds pressure—and pushing the remaining gold solution out of the cakes, escapes by the outlet plates into a launder conveying it to the gold solution vat over the precipitation boxes.

As the washing process is one of "displacement" it will be readily understood that it is practically absolute and the residue slimes will contain only gold that has not been brought into a state of solution. This is a point that will appeal to many on the Rand whose trouble in treating slimes by the decantation process has not been so much getting the gold into solution as getting it out of the solution afterwards—it has not been a chemical difficulty in fact, but merely a mechanical or commercial one. As soon as the slimes cakes are sufficiently washed, the press is unscrewed and the frames or leaves pulled apart and the residue slimes cakes are dropped into trucks below and sent away to the dump.

With ordinary care and attention to details and assuming that the necessary conditions for success, as I have endeavored to briefly sketch them, have been complied with, I think it will be found that treating, say, 4 dwts. to 4½ dwts. slimes on the Rand, a uniformly good extraction of say 90% may be obtained at a minimum expenditure of cyanide solution. The probable cost of labor to run agitators and presses here to treat same capacity of slimes as now being treated by a slimes decantation plant will be, say, 1s. per ton of dry slime, and filter cloths for the presses may pan out at another 2d. a ton of slime treated. These figures, of course, are only approximate and are based on the working costs of presses on other gold fields.

Need of Good Roads.

The general public is now very largely in favor of good roads, if they can be obtained by some method of taxation that will be just and equitable. This country has been raising millions of dollars' road taxes and spreading it over highways so thin that there has been no perceptible improvement for a century, except in a few States. Proper legislation has proven the one thing needful to take the stream of wasted taxes and turn it into hard, smooth, permanent highways; hence, as I said in the beginning, proper legislation is now the most important division of the road problem.

STATE LAWS.—Long before any other State, in 1891, New Jersey passed a most comprehensive, successful and just road law. Its principles have been copied by most of the States having any pretension to a system of progressive, permanent road building. In brief, the Massachusetts law provides for three highway commissioners who have full charge of spending the road funds. A community desiring to improve its roads petitions the authorities, who refer it to the State engineer, who examines it and reports to the commissioners as to whether it is practicable to build or not. The commissioners proceed according to this report, as far as they have funds, in the order of date of petitions. The State pays the entire cost. Massachusetts has spent an average of \$600,000 a year for several years in building permanent highways. The law also provides that only a limited number of miles can be built in any county during the year.

Connecticut has also been active in permanent road building of late, appropriating from \$400,000 to \$500,000 each year. In that State the town pays one-half and the State one-half.

Rhode Island has a law that gives the highway commissioners the power to build in each town a half mile of sample permanent road, but has no other State aid.

California has highway commissioners, the result of a strong effort about ten years ago to formulate a good road law. These commissioners are allowed no funds except \$31,000 a year to defray expenses. Their work is entirely instructive.

Indiana has a law which is accomplishing a good work. It provides that, on petition, the commissioners may order an election to determine whether a new road shall be built and the county can issue bonds or levy a special tax to pay for it. Minnesota has a law similar to Indiana.

The New York legislation is nearer like that of New Jersey than any of the other States. While the New York Legislature was discussing this subject, they appointed themselves a committee of the whole and visited the good roads of New Jersey to inspect them and view the working of the first State aid road law. Outside of the above-mentioned States, legislation has done little for the betterment of our roads. In a number of States, including California, there are laws providing for the use of convict labor for improving roads or crushing stone for them.

THE NEW JERSEY LAW.—The summary of the New Jersey law is as follows: Upon petition of two-thirds of the properties on a public highway at least a mile long, the county board shall proceed to construct such road, after having advertised for bids, upon specifications approved by the State authorities, provided that in one year the amount shall not exceed 1% of the tax levied for that year—the cost to be paid, 10% by the property owners along the road, 33½% by the State and 56½% by the county. The New York law differs in some minor details, and in that the State pays 50%, the abutting property owners 15% and the county 35%. Both these States have petitions filed asking for road improvements far beyond the appropriations every year. A great advantage in the New Jersey law is that the people have the say as to what roads shall be improved, if they are willing to pay a just proportion of the cost as well as their regular taxes. They are not everlastingly paying road taxes without seeing any real good accomplished. Another advantage under this law is that for every dollar spent there is a permanent gain. Under the present system, or lack of system, in most of the States, we could go on forever, and the last year before the judgment day we would still be hauling our produce through mud or dust. Several of the counties of New Jersey have now practically all their roads in a condition that is almost perfection. To build these roads the counties were bonded. After three years' experience with the improved roads, it was found that

the people were paying less taxes for roads than ever before—that is, the tax levied for interest on bonds, sinking fund to pay off bonds, and for repairs on roads, was considerably less than the road tax for patching up old roads had been, not mentioning the comfort, the pleasure, the increased value of property, the hauling of loads for two-thirds the former cost.

Topographic Survey of Northern and Central California.

Under the general direction of R. U. Goode topographic work is being prosecuted by the U. S. Geological Survey in various localities in California during the present field season. In the northern part of the State a special map is being made of the Keswick mineral region, including an area of about 30 square miles. A portion of this area is included in the Government map of the Redding quadrangle, which has been recently surveyed on the scale of about 2 miles to the inch. The special map will be on the scale of about 1 mile to 3 inches, the large scale being necessary to a proper study of the geologic questions involved in this important district. The party engaged in this work is in charge of A. B. Searle.

In the central portion of the State two parties are operating. One is in charge of R. B. Marshall, with G. R. Davis and L. D. Ryus as assistants. The party will complete the survey of the Kaiser Peak quadrangle, which includes the upper portion of the San Joaquin river.

The second party in central California is in charge of E. T. Perkins. Principal assistants are A. I. Oliver and W. V. Hardy. This party will survey the section in the vicinity of Kaweah and Three Rivers, an area of nearly 1000 square miles, including the headwaters of the principal tributaries of the Tulare river.

Triangulation in Western Montana Forest Reserve Completed.

A preliminary report from R. H. Chapman, topographer, indicates the progress of the work of triangulation in western Montana, in the Lewis and Clarke and Flathead forest reserves, later to be followed by topographic mapping. In this report the completion of triangulation in the Lewis and Clarke reserve is announced. This forest reserve was created in 1897, and has an area of 4572 square miles. It occupies the crest of the Rocky mountain range for its entire width in northwestern Montana, in one of its most rugged portions, some of the peaks reaching an altitude of over 10,000 feet.

The plans for this season's work include the extension of triangulation over the western part of the Flathead forest reserve and across the Kootenai river, embracing the area between this stream and the eastern Idaho line which has been proposed as a timber reserve; the work is then to be connected with the monuments marking the Canadian boundary, and with the triangulation stations near the Idaho line which depend upon a base measured near Spokane, thus affording a check upon the accuracy of the work. Another check-base has been measured near Kalispel, and will be connected with the main system through the necessary stations.

A Decade of Mineral and Mining Returns.

The division of mining and mineral resources of the United States Geological Survey, under Dr. D. T. Day, has recently issued a chart showing the quantity and value of the mineral productions of the United States for the ten years ending with 1901, which will be widely sought because of its convenience for reference purposes. Without attempting an analysis of the statistics presented, it is noticeable that the value of the total output of metallic ores, such as iron, copper, gold, silver, etc., was in 1901 \$524,873,284, against \$307,936,189 in 1892; and that the value of the non-metallic products, including coal, petroleum, natural gas, building materials, etc., was \$566,351,096 in 1901, against \$339,958,842 in 1892.

From the compact arrangement of the metallic and non-metallic resources on a single sheet, it is possible to follow the yearly change in the production of about sixty of the important mineral products of the during the country decade. The chart, to be had on application to the Director of the United States Geological Survey, is issued in advance of the report, "Mineral Resources of the United States, 1901," which will be ready for distribution in the fall.

Notable Electrical Progress.

From San Jose, Cal., under date of August 30, the following is received:

"Last night every single electric light in this city drew its origin from the long distance power station of the Standard Electric Company, 153 miles away, in the heart of the Sierra Nevadas. Over these miles of aluminum wire, strung on high masts, there was harnessed and carried a force that moved the street car lines of the city, the printing presses, the powerful machinery of manufactories, and even the delicate manipulation of the dentists' instruments for drilling teeth. It was the first time in the history of any city that its entire electric power was borrowed from a source so far away."

* Condensed from Journal Chemical and Metallurgical Society.

The Eames Motorette.

The accompanying illustration shows a simple and practical run-about vehicle weighing less than 100 pounds, adapted to carry a person weighing 200 pounds, at from 5 to 10 miles per hour. This motorette is operated by a gasoline engine of 1½ H. P., driving a hall-bearing counter-shaft that in turn drives the two large wheels of the machine. The transmission is all by means of belts, making it

importations were added to the supply. The result was an extraordinary accumulation of the red metal in the hands of leading interests. For a while co-operation between the principal producers was tried, and, when this failed, coercion was attempted by the breaking of the market toward the close of the year. This was preceded by a very serious decline in the shares of copper companies on both sides of the Atlantic.

The total product of domestic copper in the United States in 1901 was 268,782 long tons, as against 270,588 long tons in 1900. The amounts produced and the relative percentages of the total production of Lake Superior, Montana and Arizona were as follows:

Lake Superior, 69,772 long tons, percentage of total production, 25.9; Montana, 102,621 long tons, percentage 38.2; Arizona, 58,383 long tons, percentage 21.7. Mr. Kirchhoff discusses at some length the conditions and productions of the mines in the Lake Superior district, in Montana, in Arizona, in Utah, and in Tennessee.

The total imports of copper in the United States in 1901, from all sources and in all forms, amounted to 124,938,323 pounds, as compared with 103,895,026 pounds in 1900, with 93,172,191 pounds in 1899, and with 50,268,499 pounds in 1898.

The total value of the exports of copper from the United States in 1901 was \$36,071,448, as compared with \$58,875,439 in 1900, with \$43,485,654 in 1899, and with \$35,545,251 in 1898. Germany is by far our largest customer for copper, since the greater part of the metal shipped to the Netherlands is in transit for that country; on the other hand, some of the copper which goes to the United Kingdom is shipped from there to other countries. The details of these movements cannot well be followed.

The estimated consumption of copper in the United States in 1901 was 382,761,014 pounds, as against 356,891,121 pounds in 1900.

The stock of copper on hand in the United States on January 1, 1902, is estimated as being at least 300,000,000 pounds, equivalent to six months' production. In the absence of figures which might be said to represent normal years, it is impos-

sible to do more than make a guess at what might be considered the excess over a reasonable stock. It is probably fair to assume that, even at the beginning of the year 1901, the stocks of copper in this country

Effect of Oil Fuel on Boilers.

In reporting on the effect of petroleum on boilers when used as fuel, F. C. Bitgood, boiler inspector for a steam boiler inspection and insurance company, says that when oil fuel was first taken up the inspectors were told to note its effect on the boilers. Thus far scrutiny has failed to reveal any bad effects, where proper care was exercised. It was found that in case of too great concentration of the oil flame upon certain parts, tubes were bent and shellplates overheated. Some apprehension was felt at first that the amount of sulphur contained in the crude oil might cause rapid deterioration from pitting and corrosion, but no extraordinary pitting of tubes and shells have been noted since the introduction of oil as fuel. This may be accounted for by the fact that the amount of sulphur liberated per thousand heat units is less with oil than with coal.

The wear and tear upon the boiler structure is reported to be less with oil than with coal. Much of the wear and tear with coal is due to the strains produced by the sudden and frequent rushes of cold air against the hot plates and heads while furnace doors are open for firing, resulting sometimes in leakage at tube ends and seams and small fractures of the boiler plates. These are avoided by using oil for fuel—the doors never opened, the temperature remaining practically even. In some cases where constant trouble had been experienced with coal, there was an improvement when oil was introduced.

Double Cupelling Furnace.

Herewith is illustrated a double English cupelling furnace, consisting of two removable reverberatory hearths which lead into a flue in common, each hearth, it will be observed, being heated by a separate fire box, the hearth being an iron frame—a test bottom—filled with a mixture of fireclay and pulverized limestone, the test bottom being supported on a car so that it can be readily removed and another bottom substituted in its place, pipes connected with a fan or blower conducting blast to the firebox and to the lead bath.

The fact that lead melted with free access of air is oxidized to litharge, while silver and gold (should any be present) remain unchanged, is used to advantage in separating gold and silver from lead and other base metals by cupellation, usually conducted in a reverberatory furnace, the oxidation of the lead being hastened by a blast of air made to play over its surface, the litharge being allowed to flow off as fast as formed, thus permitting a fresh surface of lead to be continually presented for oxidation. The operation is continued until all the lead has been converted into litharge and removed, the remaining contents of the hearth being a molten mass of refined silver or dore bullion. This operation may take several hours, fresh bars of argentiferous lead being added from time to time. The silver remaining in the test at



The Eames Motorette.

cleanly, noiseless and smooth running. The frame is steel tubing, and carries a nicely upholstered seat with a spring steel back, the seat resting on four coil springs, making a very easy riding vehicle.

The machine is fitted with a hand-propelling device, but with free running sprockets, so that the handles remain stationary except when used by the hands.

It is started from the seat by giving the handles a turn or two, then opening the throttle.

The guiding is done from the lever at the left side of the seat, and with this same lever is connected the brake, so that both can be operated by the one hand. The guiding wheel is also fitted with springs holding it in a straightforward position, so that it will run straight ahead unless turned by the lever, thus doing away with liability of accident through disarrangement of the steering gear.

The capacity of the gasoline tank is ½ gallon, which will run the machine from 30 to 35 miles; cost 10 cents, or ½ of a cent per mile.

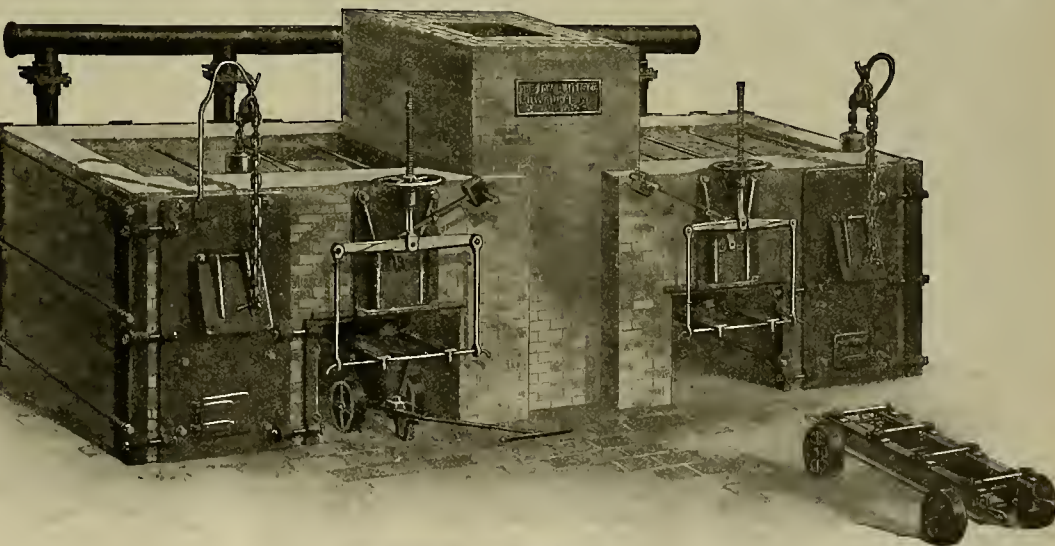
The electrical ignition is from four cells of dry battery, which will last from 500 to 1000 miles; cost 50 cents each, or \$2 per set.

The Eames Tricycle Co., 2018 Market street, San Francisco, are the builders, and are now designing a two-seated vehicle on similar lines, adding about 50 pounds to the weight, and with higher rate of speed.

Production of Copper.

The production of copper in 1901 is reported by Charles Kirchhoff in Mineral Resources of the United States, 1901, now in press, U. S. Geological Survey.

The conditions surrounding the copper-mining industry during the year 1901 were in many respects extraordinary. Production was only slightly less than it had been in 1899 and 1900, and consumption in this country was undoubtedly considerably greater. But a determined effort was made during the greater part of the year to maintain values in the face of adverse conditions in the countries which are the principal customers for our large surplus. Prices were kept above the parity of Europe, so that large



Double English Cupelling Furnace.

were beyond the working limit. The copper market opened in 1901 rather dull at the official prices of 17 cents for Lake and 16½ cents for electrolytic, but actual sales were made at 16½ cents for Lake, and at 16½ cents for electrolytic. By the 13th of January, 1902, the official prices had fallen to 11½ cents for Lake copper. The world's production of copper in 1901 was 511,803 long tons, as against 487,206 tons in 1900, 463,693 tons in 1899, and 429,379 tons in 1898.

By far the most important of the new mines which have entered the world's market in recent years is that of the Greene Consolidated Copper Co., whose properties are located at Cananea, Sonora, Mexico. There is every reason to believe that, before the close of the current year, the production of this company will reach 4,500,000 to 5,000,000 pounds of fine copper per month. Such a rapid development has never before been witnessed in the copper-mining industry.

the conclusion of the operation may amount to several thousand ounces.

In a lead refinery where there is much lead to be cupelled, the silver-lead bars from the retorts are first concentrated by cupelling off a large percentage of the lead in a large water-jacketed cupel furnace, the rich silver-lead thus obtained being afterward completely cupelled in a smaller cupel furnace. The cupel furnace is sometimes used for extracting silver and gold from lead bullion obtained from the blast furnace, the litharge being afterward reduced with coke in the blast furnace. In leaching works, where silver is extracted from the ore by sodium hyposulphite and precipitated as sulphide, the best method for refining the sulphide is to cupel it with lead, fine silver bars being the resultant product.

The cupelling furnace here illustrated and described is made by the Allis-Chalmers Co., Chicago.

Road Grades.

Written for the MINING AND SCIENTIFIC PRESS by C. H. FITCH.

The saying is attributed to an Indian: "It is easier to walk than to run, easier to stand than to walk, easier to sit than to stand, easier to lie down than to sit down." So he lay down. In building mountain roads grade is the necessary evil, and the chief thing is to have the roads lie down and rear as little as possible.

In one of the Engineering News' prize essays on road building, the principle is laid down that there should be no reverse grades. An even minimum grade is specified between two points of elevation. This is a good illustration of theoretical engineering proceeding by axioms and incurring great expense to obtain a small advantage. It is true that in going from one point to a higher point in a given time the least power is required on an even grade provided that speed be uniform. If grades were variable, however, and speed slackened on the higher grades, no more power might be required.

Practically roads follow the contour of the country up hill and down dale, and the lifting power is distributed over such a time of travel as not to be serious. The easement coming down also offsets the labor going up a reasonable grade.

The principle that there shall be no reverse grades is not of importance and it can only be realized in most cases by excessive costs of cutting and filling. The better plan is to take every advantage that nature affords, and follow the contour of the country with no more change than necessary to soften grades to a comfortable point.

But there is another argument than that of cheapness of construction in favor of light variable grades. They are easier on man and beast. I once took an object lesson on this very point at the expense of the State of Connecticut. Surveying the park surrounding the statehouse at Hartford, I laid out a walk up the 90-foot hill on which that building stands. It was a geometrical curve in plan, and the center line was a perfectly true grade from top to bottom. It was laid in asphalt and I was prepared to take pride in it, but for some months I was obliged to take my own medicine, and traverse that path several times a day. It was the most tiresome walk for its length I ever knew, and I have climbed mountains until it seemed as though I would be paralyzed with exhaustion going up and telescope all my joints in coming down. In the summer following came Frederick Law Olmsted, landscape gardener, under whose orders the walk was torn out and different approaches made.

The anatomical reason alike in man or beast is that of the fatigue of muscles which are obliged to repeat the same motion many times without variation. In such repetition a strong man may exhaust himself in no long time, though the load lifted be no more than a feather. Even a level is more tiresome than light variable grades.

It is desirable to meet difficulties singly. One of the first tales read by a boy in Latin is that of the combat between the Horatii and the Curatii, three brothers on a side. Two of the Horatii had fallen, leaving one to contend against three, but the sole survivor contriving to meet his opponents one at a time slew them all. A grade is a disadvantage, increasing the pull. A sharp curve is a disadvantage, because the leading horses can only give an oblique pull, and the heaviest pull of all comes on one wheel horse. Hence a curve on a grade reduces the capacity of the road by two deductions at one point. Abbott says that this principle is not generally understood, or is ignored. Yet upon such a curve the roadbed is usually widened. This gives opportunity to relieve the sharpness of curve by sidling across the road. With a given grade "winding" the road helps the grade, reducing its steepness by elongation.

I once remarked of a crooked road that it appeared to have been originally surveyed by a cow. I have since formed the opinion that there are worse surveyors than cows. The cow follows the easiest lines; the human road builder often takes a stiff, straight rule for both plan and grade, making great labor and cost of construction and no corresponding gain in comfort of use. These things are wearisome to think about and the mind travels as well as the muscles of the legs. Cities laid out like checkerboards and turnpikes which mock the imagination by seeming changeless and eternal are things of weariness forever.

The legs of a horse are like those of a man in wearying under the same kind of effort on a uniform grade. A horse in starting a load or overcoming a stiff grade will exert much more effort than usual for a short time. A pair of ruts on a level road the distance apart of axles will make an obstacle much worse than a 12% grade, and in getting out of them the direction of pull is unfavorable, not being parallel with the grade, not a lifting pull but one which tends to force the wheels down and against the obstacle.

There is not much lost in up and down or reverse grades if the heavy grades be lightened to the 8% limit and stepped by level intervals. When we follow

the lay of the land as far as possible without excessive grade we reduce expense materially over the cost of a stiff even-grade straight-line road, which requires much more cutting and filling. The sinuous curve helps the grade, and power is now so readily available at light expense, and it takes so little power to elevate a load slowly, that a power lift might be arranged to overcome a stiff transition from lower to higher country, saving a larger expense in road building.

In softening grades a cut costs less than a fill, as the fill requires a widely spread base, and work of placing and solidifying as well as removal. The cut is more subject to slides and snow drifts. There is opportunity for thought in avoiding the formation of drifts. A drift forms where carrying power of wind slacks by being retarded by resistances, and especially where the current rises. Abrupt breaks and rough surface immediately above the road, and elevations formed by cuts on the down-mountain side, are drift formers. A narrow cut clears itself, and a wind cut is a relief to the road. A depression into which the wind eddies, and rising discharges its white freight, cannot be prevented from filling up.

When we have a high ascent to be gained we do not lay out a grade slope for a man to climb. We build stairs, and in all the work of ascent the man continually stands upon a level. If he requires rest he has a stable position, and does not tend to slide back down hill. The step clinches every rise and enables him to maintain himself at any height gained. Even quadrupeds can mount stairs with some facility. College boys for a prank have driven a cow up into a heltry, but it was not so easy to get her down again. Stepped grades in roads are, however, comparatively easy to ascend and descend. In these refinements the skin or surface hardness of a road is all important. It is important anyway. If one pair of wheels is on a grade and the other pair on a level, and the load is evenly distributed between the axles, only half the load requires to be pulled up the steep grade at a time. Even a low vertical obstruction may be passed by one pair of wheels with a horizontal pull on the other pair to roll them up.

Some machines like animals move by impulses. An engine driving a saw through a log, a butterfly valve being opened to meet the resistance with all the pressure there is, affords an example. So I have seen a traction engine that would rear up and get over fair sized logs. But I do not approve of such uses. We should be gentle with both machines and flesh, and strain neither unduly, as we hope for good service and light repairs.

Forethought smooths the way first in making the road and second in using it. Some teamsters no doubt look ahead, but most of us in roads of every kind let the ruts find us instead of going ahead to judgment in passing the ruts.

Utilizing Water Flow.

At the Ontario mine, Utah, a tunnel was begun at the foot of shaft No. 2, at the 1500-foot level. It required six years of difficult work, with many mishaps from excessive flows of water, to complete this work. The tunnel was entirely through rock, about 3 miles long, and cost in the neighborhood of \$500,000, complete. The large amount and continuous flow of water through this tunnel led to the idea of using this otherwise wasted energy. A plant was determined upon to utilize this water to light the mine and furnish power for the shops of the mine.

The plant is driven by a 3-foot water wheel, which is estimated to deliver to the main belt 80 H. P. at 280 revolutions under an effective head of 120 feet. The dynamo is an eight-pole 60 K. W. monocy-

clerator, driven at 900 revolutions by a 12-inch belt from the pulley on the wheel shaft. The length of the line of transmission is 6½ miles over a rough and broken country, 9000 feet above the sea level. The loss in transmission at full load is estimated to be 11%. This plant supplies light to 700 lamps of 16 C. P. at 110 volts and also drives three motors, two of 15 H. P. and one of 25 H. P. Two engineers are employed to run the Ontario electric system, each of whom runs the plant twelve hours daily. No labor is involved, owing to the steadiness of the load both day and night, the attention required in the power house being limited to the inspection of oil in the various bearings and the starting and stopping of the plant at the beginning and end of each run, at which time the machinery is wiped off. The entire system at any instant involves only the attendance of the engineer at the power house, who also makes any slight repairs or alterations required from time to time throughout the distribution. The operating expenses, therefore, include only the engineer's pay, occasional repairs and lamp renewals. It is estimated that the saving in oil and fuel by the use of this plant is \$3000 per year.

Some Main Requirements.

In concluding a detailed account of hoisting and haulage in mine operations, a description of the plant on the Le Roi mine, Rossland, B. C., Bernard MacDonald says:

The data collected in this paper show that for effecting the highest economy in mining operations where a large output can be maintained, the following equipment and facilities should be provided:

1. An efficient and up-to-date system of hoisting and haulage.
2. Such associated incidental facilities as will ensure, as nearly as may be, the continuous operation of every unit of the plant comprising the system.
3. Intermediate storages of ample capacity for ore, in the mine and between the different sections of the plant, to provide against the stopping of the entire plant if an accident to any one of the units occur.
4. Separate sets of hoisting compartments for the ore, and for the general traffic of the mine, the skips or cages of each set to be run in counterbalance.
5. All loading from the main storage bins to be done through chutes opened and closed by compressed air.
6. Where hand sorting of ore is advisable, it is to be done on traveling tables of steel or rubber passing before the sorters at a speed not exceeding 45 feet per minute.
7. The waste and second grade ore to be picked out and dropped into bins underneath the sorting floor, the sorted ore to be allowed to be conveyed and delivered to the sampling machinery automatically.
8. The boiler plant to be installed not nearer than 200 feet to any of the other units of the system and at a point, if possible, where the delivery and storage of a reasonable quantity of whatever fuel is used can best be effected.
9. A convenient grouping arrangement of the various units of the surface plant adjacent to the entrance of the mine, which should be accessible by railway, or by an easy system of wagon roads.
10. An efficient system of fire protection operating preferably by gravity, or a combination of gravity and pumping. If the latter is used, sufficient tank storage should be provided, so that, in case of fire breaking out, water under sufficient pressure will be available at once while the pumps are being started.

Current Required by Motors.

H. P.	DIRECT CURRENT MOTORS			ALTERNATING CURRENT MOTORS.								
	110 V.	220 V.	500 V.	Single Phase.			Two Phase (4 Wire.)			Three Phase (3 Wire.)		
				110 V.	220 V.	500 V.	110 V.	220 V.	500 V.	110 V.	220 V.	500 V.
1	9	4.5	2.0	14	7	3.1	6.4	3.2	1.4	7.4	3.7	1.6
2	17	8.5	3.7	24	12	5.3	11	5.7	2.5	13	6.6	2.9
3	26	13	5.6	34	17	7.5	16	8.1	3.5	19	9.3	4.1
5	40	20	8.8	52	26	11	26	13	5.5	30	15	6.4
7½	60	30	13	74	37	16	38	19	8.1	44	22	9.3
10	76	38	17	94	47	21	44	22	10	50	25	12
15	112	56	25	....	....	....	66	33	15	76	38	17
20	150	75	33	....	....	....	88	44	19	102	51	22
30	226	113	50	....	....	....	134	67	29	154	77	33
40	302	151	66	....	....	....	178	89	39	204	107	45
50	368	184	81	....	....	....	204	102	45	236	118	52
75	552	276	122	....	....	....	308	154	68	356	178	77
100	736	368	162	....	....	....	408	204	90	472	236	104
150	1110	555	244	....	....	....	616	308	135	710	355	156
200	1474	737	324	....	....	....	818	409	180	940	470	208

This table gives the current taken, at full load, by various sizes of electric motors for direct and alternating current at the ordinary pressures of 110, 220 and 500 volts. The current taken by direct current motors depends upon the efficiency, and with alternating current motors it also depends upon the power factor. These qualities vary somewhat in motors of different make, so the above values must be considered as fair averages. They are useful in making wiring calculations, fixing sizes of fuses, etc. The current given for two-phase motors is the full-load current taken in each phase; the current for the three-phase motors is the current in each of the three line wires.—Science and Industry.

Examining Mines.

Written for the MINING AND SCIENTIFIC PRESS
by J. B. BALCOMB.

The first requisite of a man who examines mining property is absolute honesty—not so much to be honest with the property, but to be honest with himself, to his own better judgment. This will be elaborated a little farther on.

The next requisite is good judgment. Many a man has wrecked his own fortune or squandered the money of another, not because he did not know enough, but because he was lacking in that fundamental characteristic of being able to tell which of the two propositions is the better, and how great chances it pays to take in the individual case.

The third requisite of success is experience. The advantageous use of intelligent experience is without doubt the most necessary requisite of all, but it is impossible without the previous characteristics.

The last requisite, but by no means to be slighted because it is placed last, is technical training. The great reason why practical men of affairs place so little confidence in the so-called mining expert just graduated from college is because, in his mind, the above order is reversed. He considers the fact of his having thorough technical training as *prima facie* evidence of his being a competent mining engineer. The worst of it is that this view of the case, which has been forming itself during his university work, prevents him from assuming the right attitude when he undertakes field work. He goes into the field with geological names galore at his tongue's end, fondly imagining that they are the open sesame to success. We do not in the slightest depreciate the value of these, but we do wish to emphasize the fact that these acquirements are not first in importance.

Now let us amplify the above thoughts. By saying that a man should be honest is not meant merely that he report things exactly as he finds them, nor is it included in the statement that he should report everything he finds, more than is necessary; he must know that he finds everything there is to be found. Above all, he must not allow himself to be deceived into thinking that things exist otherwise than they do. He must not only be able to tell black from white, but he must keep his hopes and desires in the matter in abeyance—that the black will still seem black, even though it destroys the hopes of the would-be purchaser.

By good judgment is meant that happy faculty of weighing two facts under the conditions as found and ascertaining their comparative importance. Sometimes there seem to be a large number of facts that need to be compared at once. Right here is where many men fail in judgment. They try to compare a large number of facts at the same time. This is impossible. Nowhere does good judgment manifest itself more surely than in its ability to select the two things which need comparing first and in ascertaining their relative merits. When one of these has been disposed of, the other should be compared with a third, and so one by one a conclusion will be reached in regard to all of the facts bearing on the question. To illustrate: He should not try to compare in his mind at one and the same time the favorable and unfavorable geological conditions, the desirable and the undesirable physical conditions, the different kinds of reduction processes which might be applicable to the ore, the different more or less feasible plans of marketing the products, and the many things each of which requires to be weighed and determined separately. Another thing: It is unnecessary to consider what process is adapted to the ore until it has been determined that the ore is of sufficient commercial value to be treated by some process. Also, he should not allow himself to multiply the gross value of the ore by the number of tons per day which some imaginary reduction works would treat, and so arrive at an hypothetical gross daily revenue. This is always misleading, dangerous and unnecessary. By so doing a man puts himself in the wrong frame of mind, as well as accomplishing nothing useful. After agreeing to examine a mine, the first thing necessary is to get general information about the property. If there are any maps, field notes or descriptions to be had, it is well to assimilate these before even going on the ground. Also, if any geological data concerning the section of country under consideration can be secured, it is well to examine it carefully. A man thereby often saves mistakes and most assuredly gets himself to thinking along lines which he will have to follow in examining the property.

When he is on the ground he should still seek general impressions as to the lay of the land, the character of the location and the points at which abrupt changes occur; notice the general formation of the country, and especially the drainage system; see what are the main geological conditions, both on the property and the surrounding mines; make a note of what improvements there are in the way of buildings, roads, reduction works and water supply.

After gaining all of this information, the man is ready for a detailed examination of the property from a geological and metallurgical point of view. At this point it is generally best to examine the surface con-

ditions first. If there are any dikes which have a well marked outcrop, study physical and mineral characteristics. The same may be said of the country rock. With this general and particular information which nature has kindly volunteered, the engineer is ready to go down the shaft or in the tunnel. The underground work deals almost exclusively with details, and not with general impressions. While frequent samples should be taken from the surface, in the underground examination sampling is of prime importance. If there are no faults, the character of the walls will probably remain fairly uniform, and sampling at regular intervals will answer every purpose. If the ore is fairly uniform in character, it may be sampled at regular intervals, in each case noting the width of the vein. If the character of the ore is different in different parts of the vein, the extent and value of each portion must be carefully sampled, so that the value of each may be determined in the laboratory. In the case of faulting, the location and character of faults must be determined with precision.

The dip of the vein can be determined with great exactness in shafts and fairly well in tunnels. On the other hand, the strike can be determined with great exactness—except in magnetic ores—in tunnels, while but little can be done in shafts.

The objects of a mine examination are manyfold, the following being among the prominent ones: First, to determine the value of the ore; second, to determine its character; third, to determine the amount of ore "in sight" and the "probable" ore blocked out; fourth, to determine the probable cost of mining and transporting it to the surface; fifth, to determine the best method of reduction; sixth, to determine the natural advantages and disadvantages; seventh, to determine gross outlay and net revenue.

It is almost needless to say, when samples are once taken, they should be jealously guarded, so that there is no possibility of "salting." The samples in the laboratory should be handled systematically, so that there will be no possibility of ascribing wrong values to portions of the vein. So far as possible, opinions and judgments should not be formed until all values are determined. The next question to be considered is the manner of making deductions and arriving at conclusions after all this data is at hand. Following that comes the manner of arranging reports so as to make them clear and concise, yet full and attractive.

Arid Lands of the United States.

In view of the new law for the reclamation of arid lands by using funds from sale of public lands for their own development, to which we have previously alluded, a description of the arid region and its relation to the other regions of the country is pertinent. Such will be found in the report of the Geological Survey when it shall be printed, and of which we have secured an outline for immediate use.

The arid regions of the United States include about two-fifths of its entire area, and extend from about the middle of the continent westward nearly to the Pacific ocean. A broad intermediate sub-arid or sub-humid belt, near the center of the United States, extends over North Dakota, South Dakota, western Nebraska, western Kansas, and into Oklahoma and the panhandle of Texas. In very wet years the sub-humid region creeps up to the foothills of the Rocky mountains. During dry years the greater part of the plains region west of the Missouri becomes semi-arid. Arid regions are those in which the average annual rainfall is 20 inches or less. Large tracts of Canada and Mexico, as well as of the United States, and a great part of the countries of the old world, are, according to our standard, arid. Irrigation was the basis of the agriculture and, therefore, of the civilization of many of the ancient peoples, a fact of much significance to us.

WHY THEY ARE ARID.—If the surface of the globe were flat the rains would probably be distributed uniformly in broad bands parallel to the equator. But the uniform movement of the atmosphere is interfered with by lofty mountain masses. In the United States as a whole the general movement of the atmosphere is from west to east. The damp winds from the Pacific deposit their moisture on the high masses of the Sierra Nevada in the winter and on the Rocky mountains in the summer, leaving the broad lower plains lying east of each great mountain mass dry, sterile and desert-like. Thus the mountain ranges are well watered, while the lowlands are parched with drouth. These arid lands are, however, covered with a more or less scanty vegetation, only a small per cent being true desert lands, such as the Utah desert, west of the Great Salt Lake, and the Mohave desert, in southern California, near the Colorado river.

THE VACANT LANDS.—One-third of the United States, exclusive of Alaska and outlying possessions, consists of vacant public lands. These lands lie for the most part in the arid region, and crops cannot be produced upon them, nor settlers take them up for homesteads, until a sufficient supply of water has been obtained. Then crops are abundant. It is for the interest of the public at large to have all of these

good agricultural lands utilized. Who shall make their occupation by settlers possible? The answer must come from the lawmakers of the country, and they must be in possession of the facts in order to act intelligently. The laws governing the disposal of the public lands have been drawn almost wholly with reference to the lands of the Ohio and the Mississippi valleys, with their sufficient rainfall. This rectangular system of subdivision of the public lands has been found detrimental to the best growth of the western two-fifths of the United States, because attention has been concentrated upon land titles, whereas first thought should have been given to water rights, through which alone the land has value. To remedy this evil for the remaining public lands, and to gather the facts upon which intelligent action can be based, is patriotic duty. These facts pertain first of all to the water supply and its limitations.

THE FORESTS.—The forests of the arid region mark the greatest rainfall and also the sources of the streams. In obedience to public sentiment the Government has already set aside many millions of acres of forest and woodland, primarily for the supposed beneficial influence of forests upon stream flow. The open grazing lands of the arid West have had and still have their history of conflicts between the interests and the persons of the settlers, the cattlemen, the sheepmen and the lumbermen. So uncertain are the conditions surrounding the use of the public lands for grazing purposes that practically all of the farmers and the irrigators of the arid region, as well as the stockmen, ask for legislation by which temporary rights in the form of licenses can be had to the use of the forage, pending final settlement of the lands. As it is now, the ranges are frequently so overstocked that the valuable forage plants are eaten down and destroyed. This matter of grazing in the West, being of fundamental concern in the arid region, is constantly brought before the hydrographer, and it has an intimate relation to the development of irrigation and the complete utilization of the water resources of the public domain.

THE DESERTS.—Some of the actual desert lands in the United States produce nothing, even when watered, as, for example, the broad flats adjacent to the Great Salt Lake in Utah and the lands around the Humboldt, Carson and Walker sinks in Nevada. Others, like the Mohave desert, near the Colorado river, in southeastern California, produce large crops when watered. Portions of these desert lands, therefore, are reclaimable by artesian wells or by reservoirs for storing the intermittent floods of the small streams flowing from the bordering mountains. It is most important that thorough geologic examinations should ascertain the practicability of obtaining water by deep wells, and that such examinations should be verified by drilling a few wells to a depth sufficient to determine for a large desert area whether an artesian flow can be surely obtained.

A Utah Sampling Works.

The Park City Sampling Mills, estate of R. Mac-Intosh, are putting up a 500-ton sampling mill. The building is 44x65 feet by 70 feet high, equipped with rock breaker, four sets rolls, five samplers, 16x36 Corliss engine, two 150 H. P. hoilers equipped with automatic stokers. The plant for a long time has been worked under the old method of quartering down, then taking the quarter, crushing it up and sampling that down. By the new method (this mill is being built right on to the old mill) everything will be sampled. Everything will be delivered from the cars right to the crusher and pass through the crusher. From the crusher everything will be elevated to the top floor and all pass through samplers of the larger type. There will be a 25% cut made and the 75% rejection will go to the shipping elevator and be delivered to the shipping bins, where it will be loaded directly into cars as fast as sampled. The 25% which was cut out by the sampler will pass through a 36x12-inch high-grade rolls and be reduced from 1½-inch to ¾-inch in size. This 25% will then be elevated and pass through a second sampler, where another 25% cut will be made, the rejected going to the shipping elevator and the sample to the second set of 30x10-inch rolls. This process is repeated four times, each successive cut being 25%, and passing each time through a set of rolls to be again passed through a sampler. Out of a 250-ton lot the final sample of 600 pounds is delivered into duplicate bins over the sample grinder reduced to eight mesh. From these bins it is drawn off into the sample grinder and prepared for the assay office. The mill will be automatic throughout and will be a great saving in labor, thorough and accurate in its work. The mill will be lighted by electricity throughout and heated by steam. The plant was designed and erected by J. B. Fleming of Park City, and is under the management of C. Read, and the supervision of same will be under T. W. Hayt, who is at present in charge of the sampling works. They will also have two 100-ton Fairbanks railroad track scales. The scales are equipped with automatic registering beams. They expect to have the mill in operation in sixty days.

Park City, Utah, Sept. 1.

The Recovery of Arsenic From Ores and Metallurgical By-Products.

The elimination and recovery of arsenic from lead ores—frequently smelted by lead smelters—merits considerable attention by metallurgists, both from a sanitary and an economic point of view, no metallurgical system entailing waste, which can be saved with appropriate means at any profit at all, being perfect.

Arsenic, a constituent encountered in most lead ores, is an undesirable element in blast furnace smelting for many reasons, viz.:

1. It is very poisonous, workmen suffering greatly from its gases.
2. It causes loss in smelting by volatilization.
3. In great quantities present it forms speise, thus increasing consumption of iron flux.
4. The speise formed shortens smelting campaigns, sows being formed readily.
5. It increases fuel consumption, a less readily fusible slag being desirable, as speise is liable to chill the crucible contents.

In roasting arsenical ores in an oxidizing atmosphere, the arsenious acid, a volatile solid, is eliminated at a moderate heat—arsenious acid or arsenic

furnaces, heated by producer gas. Each furnace is connected with flues 250 meters long.

The arsenious acid nearest the furnace, being of a grayish color, is resublimed, that farther away sold as a marketable product or worked into white glass. (Preussische Zeitschrift, Vol. 18, page 199; Dr. A. Schertel, Mineral Industry, Vol. 9; C. Schnabel, Metallhüttenkunde, Vol. 2, page 503.)

As flue dust, soot and carbonaceous matter are detrimental to white arsenic, impairing its purity and reducing it to metal, the flue dust (ore) is roasted in reverberatory furnaces heated by gaseous fuel, f. i., by producer gas, generated by coke.

A furnace suitable to roast the flue dust is shown in Figs. 1 and 2. The furnace is heated by producer gas (generator not in figure) to secure a pure sublimation product. The flue dust is shoveled onto the hearth; through openings a, c, are working doors, d are openings in the hearth to drop the roasted flue dust into cars, which run on rails under the archways, A. The gases pass off through the flue, F, provided with two dampers, d1 and d2. When the furnace is charged, and at the periodical rabbling, the damper d2 is closed to avoid any ore particles being carried into the condensing chambers; in the meanwhile, damper d1 is opened and the gases pass through a stack, S, into the air. As shown in Fig. 3, two furnaces form a couple, their flues combining into one main canal.

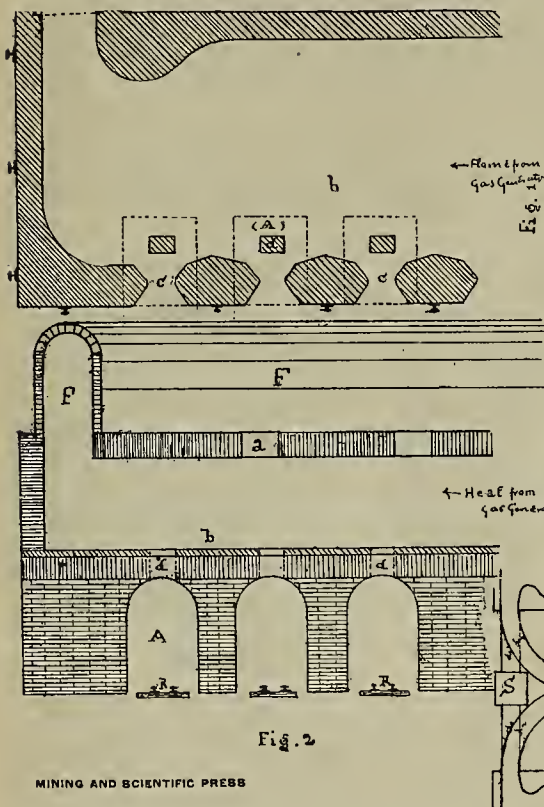


Fig. 2

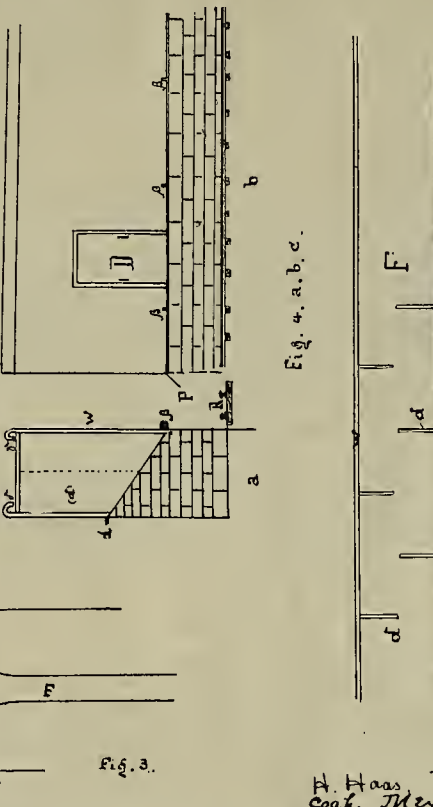


Fig. 3.

trioxide sublimes at 200° C., but, contaminated with other elements, the roasting temperature has to be heightened—and when condensed in chambers of lower temperature is obtained as a white powder, the white arsenic of commerce. As any sulphur present is burned to sulphurous acid and sulphuric acid anhydride, both volatile gases, we have means to save the arsenic as well as the sulphur in one roasting operation. The arsenic is condensed, while the sulphur gases, after they passed the arsenic condensing chambers, are completely oxidized by a nitric oxide generator and manufactured into sulphuric acid by the chamber process.

A roasting furnace, embodying and combining the above features, has been designed by Serjeant & Flude, the roaster proper, resembling the Brunton automatic roaster, is heated by hot air. The arsenious acid gas and the sulphurdioxide and sulphur trioxide pass the condensing chambers; the arsenious acid is deposited, the sulphur gases pass a nitric acid generator and then leaden chambers to be converted into sulphuric acid. This furnace will hardly be adopted in large lead plants, its capacity being too small, but has come into use in Australia to roast the arsenical and sulphide concentrates of gold mills. In large smelting plants the arsenic and sulphide ores are best roasted in the modern automatic roasters, which connect with long flues to collect the flue dust and arsenious acid. If the manufacture of sulphuric acid is aimed at, the sulphur gases are purified by filtering and led into acid chambers. The flue dust containing the arsenious acid is roasted in an oxidizing atmosphere in special furnaces, connected to long flue chambers, a length of 300 meters being not uncommon to encounter in the leading arsenic-producing districts of Devonshire and Cornwall, England. In Freiberg, Saxony, all the arsenious acid is collected with the flue dust, derived from roasted ores, and the flue dust is roasted in reverberatory

The white arsenic fumes are condensed in a canal, constructed as indicated in Fig. 4, a, b, c. The walls, w, and plates, d, are lead-lined and waterjacketed, the water entering jackets at d and f. At the top the jackets are bent and open to discharge the water at d4 over the roof of the canal; the roof is slightly inclined, the water running towards the rear end of the flue into a tank, to be used again. The sudden decrease in temperature makes the arsenious acid to drop readily, thus dispensing with very long condensing channels and diminishing the corroding effect of the arsenic on the lead, hot fumes being more detrimental and deleterious.

As seen from Fig. 4a, the bottom of the flue slopes at an angle of some 40° towards the front; this secures an easy removal of the white arsenic, which can be dropped through doors, D, directly into cars, running on rails, r, thus facilitating the work greatly, which is a disagreeable job at best.

The flue dust is now tolerably free from arsenic, and, briquetted, can be smelted in the blast furnace; besides that profit, an additional profit is gained from the arsenic, which can be sold either as white arsenic or white glass, if it has been worked into that article.

As most large smelting plants have roasters to recover the arsenic, it would but necessitate the additional expense for the erection of the reverberatories and the condensing canals. Considering the great sanitary and economic advantages gained by their adoption, prosperous and genial-conducted metallurgical establishments should not hesitate to make improvements in that line. Most of the appliances in Europe (Germany) for the recovery of poisonous gases were forced through by laws, prohibiting the conducting of gases, injurious to animal and vegetable life, into the air, and, owing to those laws, many metallurgical plants made profits not realized before.

Torreón, Mexico.

H. Haas
Torreón, Mexico

By-Products From Rand Cyanide Works.

The by-products that are obtained from the cyanide works, says Chas. Butters, are very much less in the case of fresh unoxidized ores than from acid or partly oxidized ores. Where the ores crushed have been exposed to atmospheric influences and are partly weathered the products of incomplete decomposition of the iron compounds always introduces a series of complications in the solution and precipitation of the gold that increases the amount of by-products, whether the gold so dissolved is precipitated by chemical or electrical agency. In the case of unweathered pyritic ore, or of perfectly oxidized ore, a solution is obtained comparatively free of iron salts, but in the case of a partially oxidized ore the ferrous and ferric salts produced, form, with cyanide and alkali, ferro-cyanides and ferrous and ferric hydrates. These diminish the efficiency, more especially of the chemical precipitating agency, and also increase the amount of sludge obtained from the electrical precipitation boxes. In the case of these acid ores a comparatively large amount of lime is needed, which, going into solution in the shape of hydrate, carbonate and sulphate of lime, crystallizes out in the zinc box and in the electrical precipitating box upon almost everything that it comes in contact with, more or less destroying the precipitating surfaces. This is a serious difficulty in the treatment of acid slimes. The surfaces of the lead cathode are almost completely covered after a few weeks by these comparatively insoluble lime salts which gradually slip off the lead surfaces. By carrying down gold they thus tend to enrich the precipitates in the bottom of the boxes, as well as the floating precipitates which pass through the boxes and out into the sump. In zinc precipitation everything that accumulates in the box in the way of slime is taken as the main cleanup. The particles which flow away from the box in mechanical suspension in the form of insoluble complex cyanides and hydrates, clayey matter, insoluble humus which has been precipitated from humic acid, and, in fact, any flocculent precipitates that may float through the box, will always carry gold along with them, which may be partly deposited in the sump. Hence one might properly say the only by-product produced directly from the zinc precipitation boxes, outside of the products resulting from the treatment of the zinc slimes, are the precipitates obtained from either the settlement of the precipitated liquors, or the precipitate obtained by filtration of all the liquids after passing through the zinc box. Under ordinary conditions, in a well-conducted cyanide works treating fresh ores, filtration of the precipitated solutions merely to obtain the floating matter from the zinc boxes would not pay, but where acid ores are treated, the precipitated sludge obtained from the sumps is of sufficient importance to warrant its careful collection. This precipitate varies in value from 1 up to 20 oz. to the ton. Precipitates so obtained from the Simmer and Jack cyanide works, where fresh pyritic ores have been treated, assayed 2 oz. 18 dwts. During the precipitation of rich solutions, running from 5 oz. to 8 oz. to the ton, flocculent precipitates assaying 14 oz. per ton, and composed of zinc cyanide and zinc ferro-cyanide, insoluble in the dilute liquor used, were carried over into the sumps. A skimming taken from the top of the treated tank partly mixed with exhausted residue gave an assay of 16 dwts. per ton, due mainly to finely divided precipitated gold which had been pumped back. Black skimmings of organic matter, resulting in the same way from the filtering through sand of precipitated liquors, gave an assay of 5 dwts. per ton. I consider it worth the attention of cyanide managers to see that the sumps are regularly cleaned of sludge, which may be dried by pouring into a small enclosure or dam made of tailings in the open air. After two or three weeks this material is dry enough to sample and assay, and in nearly every case will be found rich enough to sell to the smelting works. The gold in precipitates so obtained is not easily soluble in cyanide solutions unless special preparation is given to their proper oxidation, either by means of preliminary roasting or long-continued exposure to aeration and agitation with cyanide solution in an agitating vat.

ONE objection always urged against the use of induction motors of the squirrel-cage rotor type is their poor starting qualities. This is overcome in an interesting manner in the installation for pumping in the Horcajo mines, Spain. Each motor is connected to a high-pressure centrifugal pump, and three pumps, placed at different levels in the mine, are connected in series to overcome the hydraulic head of 1272 feet. In starting, one generator is run somewhat below normal speed. Then the first motor is thrown on an autotransformer and, after having come up to synchronism, is transferred to the generator and the second started on the autotransformer and so on. The motors start in this way at zero torque; and since, at the lower speed, they cannot overcome the hydraulic head, they absorb but little power. After all three are running, the generator is speeded up and delivery of water begins. It should be noted that, since the pumps are in series, all the motors run at the same speed and handle the same amount of water, all doing the same work irrespective of their vertical distances apart.—Electrical Review.

Save the Forests.

The two pictures on this page convey an impression which cannot be deepened by words. The beneficent gift of nature to many generations still to come is ruthlessly destroyed by the clumsy effort which this generation makes to secure its share. There could hardly be a more impressive picture of wastefulness. But while there is little to be said about the impressiveness of the contrast in the scenes, there is another side to the matter, and that is one of hopefulness. Forest preservation is gaining in the public mind. The great reservations which have been made will teach preservation by example. By example also is to be taught the lesson of securing the timber crop without destroying the forest and of utilization of the products of cutting without waste and without inviting ruinous fires by leaving the forest floor densely covered with inflammable material. Another hopeful sign is the resoluteness with which organizations in the interest of forest conservation and water storage are now working. One leading organization is the Water and Forest Association of California. Membership is held in all parts of the State, and the objects of the association should appeal to thousands not now enrolled. Full descriptions of the purposes and work of the society can be had by addressing the secretary, Mr. T. C. Friedlander, at the society's office in the Mills Building, San Francisco, Cal.



Scene in the Sierra Sequoia Before Lumbering Began.

Cost of Mineral Surveys in Arizona.

First in getting a patent to a miner's claim is to obtain from the U. S. Surveyor-General an order for an official survey by a U. S. Deputy Mineral Surveyor. The cost of the work in the Surveyor-General's office is as follows:

which he receives a duplicate and triplicate certificate. The duplicate is sent to the Surveyor-General by the claimant, together with a certified copy of the location notice. The Surveyor-General transmits as a basis of survey this location notice to the deputy mineral surveyor named by the claimant to make the survey. This order gives the numerical number of the survey, by

The Surveyor-General always appoints enough good surveyors, U. S. deputy mineral surveyors, to prevent any one or a few men having a monopoly on this kind of work. In fact, the Surveyor-General never declines to appoint, on proper application, any good, competent surveyor of character a U. S. Deputy Mineral Surveyor.

Before entering upon the discharge

gets final receipt for a patent, after which it is not necessary to do any more annual assessment work on the claims.

CHALCOPYRITE has been reported more than once as an accidental product in metallurgical operations. Bornite, or peacock copper, on the other hand, has not been described as an accidental furnace product, nor as produced by sublimation. Both of these minerals are formed artificially at the smelter of the Butte & Boston Con. M. Co. at Butte, Mont. The minerals form slowly, attaining their maximum thickness of about 4 inches in the course of six months or a year, and render necessary the frequent replacement of the old rails by new ones. They form in the calciner, along the rails, in the bed of the furnace. They not only form beneath the flanges of the rails, but also slowly replace the rails themselves. When the rails are removed only a thin upper surface layer of iron remains; all the rest has been changed into chalcopryite and bornite, with the exception of that portion of the rails completely embedded in the brick bed of the furnace. There is no sharp line of demarcation between the remaining iron of the rail and the new minerals formed. Examination of these minerals shows that the one which is by far the more abundant is unquestionably chalcopryite; the other is in all probability hornite. An analysis of the former mineral shows an excess of iron; otherwise the mineral has the composition of pyrites of copper. Both minerals have been formed by sublimation, and not by fusion, since the temperature of the furnace never rises high enough to fuse the ores present.

With a Grain of Salt.

The Buffalo, N. Y., Courier of Sept. 1 says: "A combination of the mining companies, the total allied capital of which is \$7,500,000, has been formed, the arrangements having been completed in this city on Thursday last. Copper River M. Co. of Alaska, Green Consolidated Copper Co. of Arizona, Garretson Furnace Co. of Buffalo, Pittsburgh and Montana M. Co., of Montana, Garretson Southern Co., Suarahlipa M. Co. are members of the combine. The idea of the combination, it is stated, is to compete with the prominent existing copper companies in America."



Scene in the Same Forest After Wasteful Lumbering Operations.

For lode claims, each location, \$30.
For placer claims, each location, \$35.
For each millsite, \$30.

For each millsite included in one survey with a lode claim, \$15; should an amended order issue, an additional deposit will be required.

The applicant for mineral surveys deposits the above amounts with the nearest United States depository, for

which it is always known, and which number is marked on the corners by the deputy.

What the claimant pays the deputy whom he secures to make his survey, and names to the Surveyor-General, is a matter of private contract between the claimant and the deputy. Ten dollars a day is considered a fair compensation.

of his duties, a U. S. Deputy Mineral Surveyor gives a \$10,000 bond as a guarantee of the faithful performance of his official duties as a surveyor.

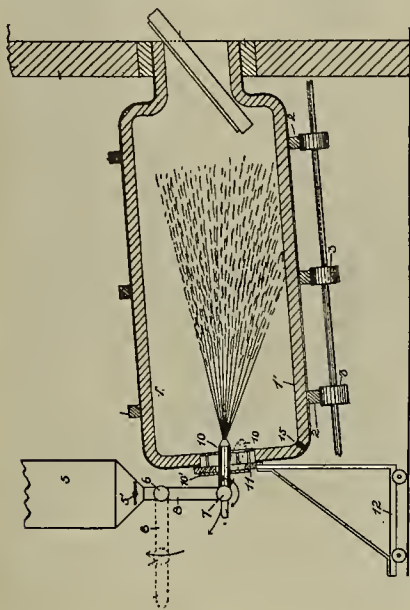
After obtaining the copy of the plat and transcript of the field notes of a mineral survey from the Surveyor-General, the claimant or mine owner takes them to the U. S. local land office, and, after the usual official routine,

Mining and Metallurgical Patents.

Patents Issued August 26, 1902.

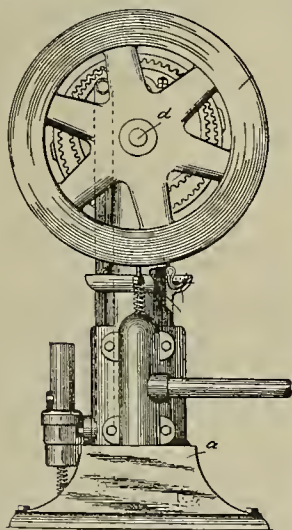
Specially Reported and Illustrated for the MINING AND SCIENTIFIC PRESS.

PROCESS OF PRODUCING STEEL DIRECT FROM OXIDE OF IRON ORE.—No. 707,638; D. Reynolds, Albany, N. Y.



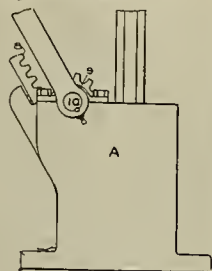
Process of treating oxide of iron ores to produce therefrom wrought iron and steel, mixing granulated ore with sufficient granulated carbonaceous material to deoxidize ore and then duly carbonize iron in it, introducing and distributing this mixture in suitable furnace, subjecting this mixture in furnace to surface action of neutral heating-flame until oxide of iron is deoxidized and iron duly carbonized; introducing and distributing into furnace granulated fluxes suitable in character and amount to remove impurities, subjecting resultant mass to action of neutral heating-flame until metal is fused, separating slags therefrom, all in one furnace.

LUBRICATING APPARATUS FOR ENGINES.—No. 707,794; E. T. McKaig, Chicago, Ill.



In device of class described, combination with cylinder, of piston adapted to reciprocate therein, channel connected with cylinder adapted to receive supply of lubricant, wick extending into channel having other end in position to contact with piston, means for holding wick in channel.

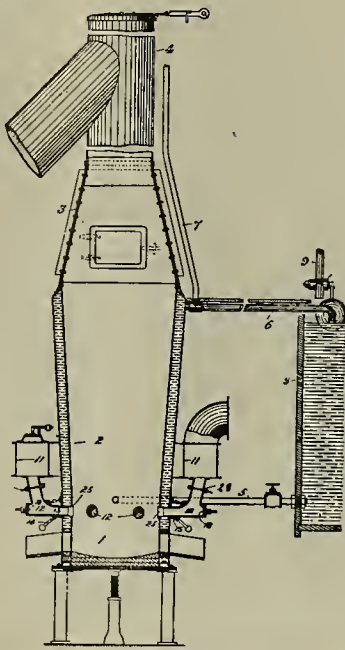
DRILL SHAPER.—No. 707,584; D. Greenwalt and J. B. Dawson, Breckenridge, Colo.



In machine of class described, combination of suitable framework provided with vertical drill opening,

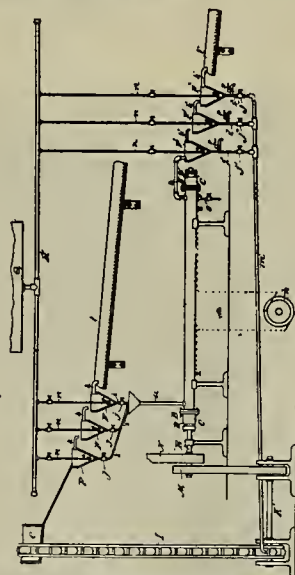
horizontal opening at lower end of vertical opening, bed plate slidable in horizontal opening, lug arranged in opening, arm hinged to bed plate, having notches interlocking with lug; knife slidable at angle with drill opening, means for actuating knife.

SMELTING FURNACE.—No. 707,601; C. Laughlin, St. Louis, Mo.



Smelting furnace comprising tuyere pipe, end plate thereof having inspection hole therein, end plate having downwardly converging lugs, and wedge-shaped plate fitting in lugs having hole adapted to register with inspection hole, plate being arranged to clamp, sheet of mica over inspection hole.

METHOD OF AMALGAMATING METALS.—No. 707,971; P. A. Knappe, Grantville, Ga.



Method of conducting continuous amalgamation of metals, which consists in causing passage of pulp through confined mercury-containing space, forcibly intermingling mercury and pulp by agitation of same, removing gangue from space, extracting heavier particles from gangue, causing heavier particles to be returned again into mercury-containing space, subjecting them to reintermingling with mercury therein.

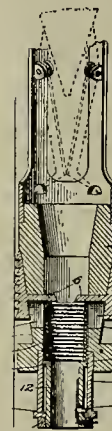
PROCESS FOR EXTRACTING PRECIOUS METALS.—No. 707,926; W. Hilt, Coles, Cal., and C. E. Lane, Ashland, Or.



Process herein described, of extracting precious metals from solutions thereof, which consists in pro-

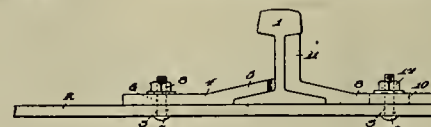
ducing cyanide solutions of metals, vaporizing metallic zinc by means of heat, conducting vapor thus formed to point beneath surfaces of solutions, producing finely divided zinc which replaces precious metals, thereby causing their precipitation.

AUTOMATIC STOP AND LOCK FOR OIL WELL CASING PERFORATORS.—No. 707,552; T. E. Clark, Visalia, Cal.



In an oil well tool of class described, combination of tubular body, vertically movable locking devices thereon, to engage casing and lock tool against descent therein; sleeve detachably connected to lower end of body, having inwardly extending flange at lower end; vertically movable plunger in sleeve; spring-pressed detent, carried by plunger, to engage flange and lock plunger in elevated position; yielding connection between plunger and locking devices, whereby latter are operated by plunger.

MINE CAR RAIL.—No. 707,999; J. A. Craig, Roscoe, Pa.



Rail joint comprising in combination with chair 9, having transverse slot 10 and upwardly projecting portion adapted to be held against under face of tread of rail, swinging plate 4, retaining pivotal bolt, free end of plate 4 being rounded and adapted to wedge against web of rail.

"Ancient River Channels."

The ancient river channels of California, from which so many hundred million dollars in gold have been taken and which contain so many thousand millions more, are not "rivers" in the ordinary sense. When these channels have been spoken of they have been called eocene, miocene and pliocene—"the dawn, the recent, the less recent and the more recent." These terms impress upon the mind the geologist's idea of time or epoch or period in the world's history. Some think this river system consisted of river channels in the ancient sea before the uplift of our continent; others that these great gold-bearing channels were rivers coursing north and south after the main chain appeared above the ancient sea; holding, of course, that gold was formed from some pre-existing rocks.

This great gravel bed and the channels and drifts run along the edge of the main mountain chain in a northerly and southerly direction with what appears to be numerous arms running almost due east and west, being crossed by the present river system in its course from the mountains to the sea.

Looking at the channel's course and then at the trend of the present rivers it is noted that they cross at almost right angles, cutting through and carrying away great areas of gravel deposited in various forms along their course, such as bars, benches, small channels, ravines and wide areas of deposit upon an uneven bedrock. Where the bedrock is slate the gravel is blue; hence, called the blue lead.

Where the bedrock is granite the gravel shows a reddish color, caused by the feldspar. The sloping nature of the land from the mountains to the sea averages about $7\frac{1}{2}^\circ$.

The overburden or cap is conglomerate cement or pudding stone. Near Deer Creek, Nevada Co., the covering is conglomerate, under which is a layer of pipe clay. At times this is crystallized; at other times, soft and tenacious as putty, under which are found seams of white gravel, streaks of red and blue, all of which are washed uneven in form, looking like sand on the ocean beach. The gold found in these lines is very fine; sometimes scarcely and often adhering to the soft granite bedrock.

Mining Summary.

Specially compiled and reported for the MINING AND SCIENTIFIC PRESS.

ALASKA.

B. MacDonald, general manager Le Roi No. 2 and Rossland-Kootenay M. Cos., Rossland, B. C., gives an interesting outline of the operations on the Treadwell. Douglas Island is separated from the mainland by Gastineau channel, which is opposite the mines, three-fourths of a mile in width and 200 to 300 feet in depth. The general course of this channel is about east and west magnetic and the Treadwell vein runs along the coast roughly parallel to it. At the Treadwell mine the outcrop of the vein is about 1000 feet back from the shore and about 300 feet above high tide. Here the vein was 300 to 400 feet in width. It was mined by the open cut and pit system until recently, but now only about one-eighth of the ore mined on Douglas Island comes from surface pits. Some of the shafts and workings on the vein are now 400 or 500 feet beneath tide water, but the workings, nevertheless, may be considered dry. The ore is broken by machine drills, each of which averages from thirty to sixty tons per day. The excavations in the vein are not timbered, but are filled with the broken ore as the work of stoping continues. Only the swell of the ore, which amounts to about 30% of the total tonnage, is taken out while the stoping between any of the levels is in progress. The remaining 70%, which completely fills the stope and affords a solid working floor for the miners, is drawn off through shoots after the stoping of the back of ore levels has been completed. The walls of the exhausted areas of the vein are supported by vertical ribs and pillars of ore left standing while the levels are preserved by the horizontal pillars left over and under them. The horizontal pillar left on the tramming level is 10 to 15 feet thick, and through this pillar shoots are opened at convenient intervals. Through these shoots the broken ore is drawn off into the tramcars. The only timbers used are the mouthpieces of the shoots and the posts supporting them. Two-ton tramcars are used in the mine, and these are loaded at the shoots and made into trains which are hauled by horses on the endless rope system to the storage bins at the shaft. A horse hauls a train of six cars while a twenty-car train is hauled by the rope system. The shafts, with one exception, are vertical, and the hoisting is done by self dumping skips. Two large Gates crushers are installed at each shaft, which break the ore as it dumps from the skips into sizes suitable for the stamp batteries. When so crushed the ore falls into storage bins, from which it is hauled by train loads with locomotives to the stamp mills. Five thousand tons is thus delivered daily to the mills, of which 3000 tons come from the Treadwell mine, the balance being produced at three adjoining properties under the same management. The production is reduced during the dry or winter season. The ore is free milling and concentrating, carrying the gold free in the quartz and combined in the iron pyrites of which there is about 2% in the ore. The stamp mills are in units of various sizes, the two largest containing 300 and 240 stamps, respectively. For each five stamps there are two 6-foot Frue vanners. The stamp duty is five tons of ore crushed through slot screens equivalent to twenty-four mesh. The stamp drop is 8 inches, 100 times per minute. The tailings are allowed to run into a Gastineau channel. The concentrates, which are produced at the rate of 100 tons daily, are hauled on barges to the Tacoma smelter, where they are treated at a cost of about \$8 per ton for freight and treatment. The returning cargoes bring coal from the Vancouver island mines. The ore is very low grade, containing only about \$2 per ton. The average costs of treatment per ton of crude ore are as follows:

Mining expenses, which includes all development work.....	\$.8400
Milling expenses, which includes concentrating.....	.1840
Freight and treatment on concentrates.....	.1425
General expenses, which includes taxes.....	.0388
Total operating expenses.....	\$1.2053
New construction.....	.0775
Grand total.....	\$1.2828
Net profit (approximately).....	\$.7172

The taxes are \$3 per stamp head per annum, one-half of which is refunded to the city corporation of Treadwell. The total taxes, not counting the refund, are, therefore, about one-sixth of 1 cent per

ton of ore crushed, or, say, .008% on the gross value of the ore. Wages for Indian laborers are \$2 per day; for white machine miners from \$2.50 to \$3 and board. The steady miners have accumulated large bank accounts, \$4000 to \$5000 not being uncommon among many of the old employees. The mining, milling and business operations of the companies on Douglas Island are conducted with almost mechanical precision. There are always millions of tons of ore blocked out, and although very low grade the problem of mining and milling the ore and leaving a substantial profit is successfully solved.

At Rodman bay 100 men are at work; this number will be increased 50%. G. E. Bent, general manager, has a 10-drift compressor running, and the working tunnel is close to the ore body, the latter of quartz, lying in a contact of black slate and queenstone, 600 feet wide. It will be crosstied by the tunnel at a depth of 1000 feet. It was intended to erect 120 stamps. Mr. Bent has ordered sixty to be set up this fall, the remainder next year.

The Wild Goose M. Co.'s pumping plant on Snake river, Nome district, is in operation. There is a delivery of 4,500,000 gallons of water per day on top of Anvil mountain, 4 1/2 miles distant, at an elevation of 786 feet above the intake. It cost \$500,000. From the point of delivery the water is distributed in service pipes to the various works of the company.

The presidential proclamation of August 22d, creating a forest reserve of the Alexander archipelago, which comprises a long chain of islands skirting the southeastern coast of the territory, is severely criticised. Prince of Wales is the principal island of the archipelago. It is a great island, larger than some of the States of the Union. Mining men refer to Prince of Wales Island as having great mineral deposits, is rich in gold and copper, carrying also many other minerals of value. By the terms of the President's proclamation further mineral locations on this and all of the islands within the reserved territory are prohibited. Vested rights, however, are respected. The settler and mineral locator prior to the issuance of the proclamation are not affected where they comply with legal requirements. During the past four years capital, foreign and local, has been invested on Prince of Wales Island, locations made, and there are many trained prospectors on this island, searching for mineral deposits. All of these must leave. Anything they find, no matter how rich, cannot be located if the letter of the proclamation is enforced.

ARIZONA.

MARICOPA COUNTY.

At Phoenix is incorporated the Colorado River M. Co. of Arizona; E. Godchaux, J. and W. M. McGinty, I. W. Levy of California.

The Leviathan M. Co., near Phoenix, has an additional 100 feet in the incline shaft completed. Road making is in progress. When the 300-foot level is reached extra men will be put on to work the crosstied both ways.

Near Phoenix, Geo. Hamlin, at the Relief mine, has the shaft down 478 feet.

MOHAVE COUNTY.

T. Ewing has sold the Leland group of mines to O. A. Turner, of Nevada, and J. W. Woodside, of Philadelphia, for what is locally asserted to be half a million cash down. The new owners will make further development of the property at a cost of \$175,000. The new company will open up the Leland and build a double-track tunnel on the vein 3800 feet in length through the Leland mountain at a depth of 800 feet. Two mills are to be built, least capacity 400 tons. It is figured that the cost of milling and mining will not exceed \$3 a ton. There are three veins running through the nine locations that comprise the property, varying in width from 3 to 25 feet.

The smelter at Chloride is fifty tons capacity; the cost approximates \$40,000. A turbine steam blower, worked by a steam jet, has been ordered; there is also a continuous air box to go on an improved slot tyeure. J. D. Heard is superintendent; Thomas Neilson, assayer and metallurgist.

PIMA COUNTY.

A St. Louis dispatch of the 3rd says the Lincoln Copper M. Co. has sold its holdings to Chicago and Cleveland men, among whom are Mr. Worth of the Motor-Cycle Co. and J. D. Rockefeller. It is said the amount paid was \$1,000,000. The company owns mineral lands 30 miles south of Tucson. Besides copper, gold, silver and lead are found on the property.

PINAL COUNTY.

It is reported that the mines of the Mammoth-Collins Co. at Schultz are to resume Sept. 15, when men will begin driving a tunnel from the Mammoth mines to the Collins group at the 500-foot level. For this reason the 70-stamp mill at Mam-

moth, on the San Pedro river, 3 miles below Schultz, where the mines are located, can not resume until the workings are repaired and the tunnel driven to the Collins group.

SANTA CRUZ COUNTY.

D. S. Bryant, H. S. Methven and C. O. Foltz of Chicago are interested in the Arizona Hydraulic Co., working the placer deposits below Oro Blanco by means of hydraulic machinery; operations are on a large scale.

The Nogales Copper Co. has organized; J. W. Thomas, Phoenix; W. M. and A. E. Thomas and E. D. Brigham, Chicago, Ill.; C. N. Thomas and F. N. Cox, Nogales. C. N. Thomas will be general manager, the idea being to absorb the Buena Vista and Pena Blanca mining companies. F. N. Cox will be superintendent.

The Buena Vista copper mine, 12 miles from Nogales, is to be worked.

YAVAPAI COUNTY.

The worst storm in the history of Jerome occurred on the 27th ult., water depositing debris and boulders in the United Verde plant to the depth of from 8 inches to 2 feet. A 35-foot embankment on the Jerome railroad washed out. On the east side of Jerome, in Deception gulch, several thousand dollars' worth of mining machinery, including a hoist and air compressors belonging to G. W. Hull, was ruined. It is estimated that it will take 100 men two weeks to clear away the debris and put the plant of the United Verde Co. in the usual condition.

Near Mayer, on a spur of the P. & E. R. R., M. T. Boss is constructing an oil-burning smelter for the G. A. Treadwell M. Co. An upright smelter can not be used for oil, because, without coke to keep the ore from clogging, it would naturally settle down so closely as to shut off the hot air blast entirely. To avoid this, Mr. Boss has invented an almost horizontal furnace, into which the ore enters from above by a self-feeder, leaving air passages for the draft. A Pelton water wheel is to be installed, but water will be piped from Wolf creek with a fall of 1600 feet. The pipe line has been completed to within 3 miles.

Although it is not given out as coming from the head officials of the United Verde Copper Co., yet the declaration is made by those who are closely connected with these officials that the first of January, 1903, will not see the smelter blown in, says the Jerome News. The fact that there are now less than 150 men at work in smelter and mines, and that the ax continues to fall daily, would indicate that the shut-down would be for some months. The force at the mine and smelter will be reduced as fast as possible to seven men.

The T. F. Miller Co. has reduced its force about two-thirds, and those discharged are hunting employment elsewhere.

The Braganza Co.'s Henrietta mine and mill have seventy men employed. The mill is turning out enough gold to pay dividends and to meet payments for the property.

Townsend & Wright have a contract to sink 100 feet on the Verde King property.

While at Jerome, W. A. Clark ordered the rent of his tenants reduced one-half during the shut-down of the works. The News looks on this as another reason for the supposition that the works will not start up for some months, as the cut would hardly have been made if work was to be started in thirty days or thereabouts.

CALIFORNIA.

AMADOR COUNTY.

The Jackson Ledger says the Mitchell mine has a shoot of ore at the 200 level. Ten additional stamps will be started up soon.—The Horn M. Co. expect to be soon shipping ore for treatment.—Williams & Fisher have a contract to sink the shaft of the Edinburgh G. M. Co. A road is under construction to facilitate hauling machinery.

The Gwin mine will soon have 100 stamps in operation.

L. A. McRae has the Manzanita tunnel, near Volcano, retimbered. An upraise has been started to connect the Wheeler and Bradshaw shaft. Cramer Bros. have a mine under bond and are working it.

BUTTE COUNTY.

It is now stated that on the north fork of the Feather river, the mining of the bed of which a company has acquired by location 15 miles, work will be begun on a large scale. The properties lie between Big Bend and Delong mines and have been worked in a superficial way. Prospecting shows the bed to be rich. The railroad will be used to transport the gravel before washing to some available spot where trouble over the disposition of tailings will not arise. It is estimated that the dirt can be moved for 15 cents a cubic yard and will yield a large profit. The North California G. M. Co. is the name of the corporation, H. H. Yard of Philadel-

phia the active representative. The railroad will be narrow gauge.

The Bay Counties Power Co. has men working on French creek. The company proposes, in addition to the waters of French creek, to use the waters of the Little North Fork, Marble creek and Jordan creek. To reach these streams a tunnel 6000 feet in length will be constructed under the ridge near Junction House.

The North Cal. G. M. Co. is the company for which the North Fork surveys have been made. The project is the mining of several miles of the river bed. The company has acquired, by location and purchase, about 15 miles of the river bed, 8 miles of which is one unbroken stretch.

The plans of the company for working the river bed contemplate moving the gravels by rail before washing; to avoid trouble with the tailings. It is estimated that this can be done for about 15 cents a cubic yard.

It is the intention to run a level cut until bedrock is reached, then work up the stream, to cause the mine to drain itself and do away with pumping. The water taken out of the stream by the usual dam above the works is expected to become a part of the mine equipment by driving the machinery. Electric transmission will be used.

CALAVERAS COUNTY.

The S. P. O. & D. Co. of Boston has a bond upon the Lloyd placer mine, situated on Central hill, near San Andreas, and will develop the property.

J. C. Jens will start work on the Look-out mine, near San Andreas on which he holds a bond.

A strike of high-grade quartz is reported at the Iowa Con. mine, Rich gulch, 6 miles east of Mokelumne Hill. Some of the ore is asserted to be almost pure gold, held together by fine quartz seams. As nearly all the land around there is patented, there is but little chance to make locations.

EL DORADO COUNTY.

R. Smith, at Omo, has a tunnel to tap his quartz ledge 600 feet below the highest point on the surface. The ledge is 6 feet wide. The ore averages \$5 per ton.

HUMBOLDT COUNTY.

The machinery and supplies for the dredger and barges for the Gold Bluff mine are at Orick from Arcata. Men are setting up the machinery for the dredger.

INYO COUNTY.

A. Walker, who owns fourteen claims near Darwin, Inyo county, has bonded the property to British Columbia men for \$100,000. The ore is said to go 30% copper.

C. Anthony will start up his mine and mill at Balarat.—A full force is kept at work at the Radcliffe mine.—Thirty men are employed at Snows Canyon in getting in the new mill and machinery and development work will soon be resumed at Tuber.

LOS ANGELES COUNTY.

The Mining Review says Los Angeles is making preparations for a miners' convention to be held there next year. The convention will be representative of that southwest mining region, a territory vast and enriched with metals and minerals and fuel oils. A proper exhibit of them and the attendance of those contributing to the exhibit will prove of great interest and value to the mining industry.

The Cerro Colorado M. Co. has incorporated in Los Angeles; D. A. Moreno of Santa Ana, V. Peyton, W. F. Botsford, J. D. Pope, J. A. Haskett, A. L. Hawes of Los Angeles, J. Hanly of San Diego.

The Estelle M. Co. has been incorporated in Los Angeles; R. C. Troeger, E. H. Sweetser, C. E. Doheny, C. Wellborn of Los Angeles.

Reorganization of the Edison Electric Light Co., Los Angeles, is planned, merging the present Edison Co. with the Redlands Light & Power Co., Santa Ana Gas & Electric Co., Pasadena Electric Co. and other corporations. New funds will be used for the construction of a 20,000 H. P. electric water plant on Kern river, with transmission lines to and from Los Angeles, erection of a steam plant in Los Angeles for reserve purposes, and smaller plants on Mill creek and Santa Ana river.

MARIPOSA COUNTY.

The Mariposa says that at the Alice mine considerable ore is being taken out and will be milled at the Princeton mill. This mine is one of the grant properties leased by Merrilees & Champion.

The Long Mary is being worked under lease by Lord, Wills, Cathey & Northrup. The ore is being hauled to Princeton.

The Organita shaft has been sunk 140 feet and will be sunk 200 feet farther. The mill will be closed down and fitted up with modern machinery; R. Dodds superintendent.

At the Grimshaw mine, Hornitos, ore is being taken out.

NEVADA COUNTY.

At the Union blue gravel mine, North

Bloomfield, the tunnel is in 4300 feet. When about 450 feet more has been driven pay gravel is expected.

A 10-foot ledge is reported in the Zeibright mine at Bear valley, being developed by F. Zeitler and W. F. Englebright. Samples of the ore assays \$10 per ton.

The new 20-stamp mill on the Coe property, Grass Valley, will soon begin crushing. Superintendent O. B. Lakenan has 1000 tons of ore stoped out.

The North Bloomfield W. and M. Co. is building a flume $1\frac{1}{2}$ mile long to supply the Gaston Ridge, Plumbago, Union Blue and Malakoff mines with water. The flume at Camptonville is being repaired; 460 M. feet lumber will be used in the construction of the new flume, which will be 60 inches wide on the bottom and 44 inches high.

The Gold Blossom mine, Union hill, is hought by G. F. Dyer, general manager Lockport Lead M. Co., and has the Buckeye G. M. Co., Mariposa, where his company operates the Hite mine. He will equip the Gold Blossom with machinery to work the mine to depth.

The 10-stamp mill on the Pine Hill mine is finished. The mine is worked through a 400-foot tunnel. A 130-foot crosscut has opened up a ledge that will average \$11 a ton in gold. J. A. Robles, the superintendent, says he will soon have thirty men at work. Three concentrators are on the ground awaiting the starting of the new mill.

Manager Puscheck proposes to resume operations at his mine at Chicago Park when the ditch is completed. The 5-mile ditch from Bear river is $4\frac{1}{2}$ feet deep, 7 feet wide, carrying 2000 inches, sufficient power to run the 15-stamp mill, the compressor and all the machinery.

Near Grass Valley Superintendent Crellel will unwater the Union Hill mine with a 16-inch Cornish pump, 8-foot stroke. The company has an ore shoot in each of its drifts going west on the 250 and 350 levels. Samples from the 250 level go \$28 28; the 350 ore assayed \$13 50. The mine shaft is down 400 feet.

Grass Valley hears that sixty men are employed at Meadow Lake and that a 10-stamp mill is in operation.

The Grass Valley Con. M. Co.'s shaft is down to the 700-foot level; sinking 300 feet farther is in progress. A new compressor of 96 H. P. has been installed.

The Dillon mine, Washington district, has been bonded by G. W. Gacen and W. W. Stover of San Francisco, who will develop it.

The Frank M. Co. has incorporated at Nevada City; R. P. Rossen, C. O. Jepsen, G. A. Hurst, A. Hongell, E. J. Morgan. The main property of the company is the Frank mine, or Old Sailor Diggings, near Blue Tent.

The Elizabeth G. M. Co., in the Washington mining district, has incorporated; C. E. Thompson, L. T. Hacks, J. H. Duke, F. P. Howard.

The South Yuba Water Co. is building a large new dam at Bear Valley, of granite, 20 feet thick at the base and 40 feet high. Culbertson lake, above Graniteville, is being enlarged.

PLACER COUNTY.

The Johnson & Wright quartz mine, Auburn, has a shaft 210 feet deep. A 50-foot stope of free gold ore is opened. A 14-inch ledge at the foot of a 60-foot shaft in the Never Sweat mine, near Ophir, assays \$30 gold per ton.

PLUMAS COUNTY.

Work on what may be the third largest mining tunnel in the State is being pushed at Bellevue mine, near La Porte. The tunnel is 8x8 feet and is now in 3600 feet, with 2400 feet yet to go before gravel is reached. The tunnel will tap the old channel of the Thistle mine. Borings have proved the channel to be rich.

SAN BERNARDINO COUNTY.

Through a transaction involving a purchase price of \$500,000, C. H. Thompson of Spokane, Wash., has secured the mining property at Manvel, San Bernardino county, belonging to the estate of the late A. G. Campbell. Work will begin to put it in shape to meet the new conditions. It will be capitalized under the name of the Federal Mining Co.

The Woodstock M. Co., organized in San Bernardino, will operate near Cottonwood Switch. W. A. Liming is manager.

Lytle Creek Power Co. has organized in San Bernardino; H. T. Hays, S. B. Wright, C. L. Allison, J. L. Campbell, W. H. Miller.

SAN LUIS OBISPO COUNTY.

The Tar Spring ranch is sold to J. M. Clapp for \$55,000; \$5000 paid down, balance at the end of the year, contingent on success in the development of the oil. The sale, it is understood, is to be made to New York and Pennsylvania men. The ranch contains 4995.87 acres, less 185.25 already sold, 8 miles from Arroyo Grande. The terms of the contract make lessees

commence work and prospect continuously.

SHASTA COUNTY.

F. E. Ware, superintendent Mt. Shasta M. Co., was at DeLamar last week to oversee the reopening of works on the McClure group.

At Old Diggings the raise from the 200 to the 300-foot level of the Texas mine is finished. Ore was found worth \$200 a ton. The mine is lighted by electric lights and the compressor is run by electricity.

The Central mine is yielding good ore from the lower level. Miners are cleaning out the cave before running the level 300 feet ahead.

The Keystone mine, adjoining the Texas on the west, owned by E. White, is bonded for \$30,000 to Redding men. This mine differs from others in Old Diggings by having copper as well as gold and silver. Ore taken out in sinking two prospect shafts yielded $16\frac{1}{2}\%$ copper, in addition to \$3 to \$6 in gold and three ounces in silver. The ore averages \$14 a ton in value.

The Lanyan & Ben Hart group of five claims is under an \$8000 bond.

W. B. Newcomb has bonded the Little Wax mine.

B. F. Rogers, superintendent South Fork M. Co., has twenty-four men tunneling. He expects to reach the ledge in about 300 feet.

The Free Press reports Keswick lively, the company hiring all the men they can get and the railroad running full blast. The company is working five train crews. There are three ore trains on the hill to the mine and they make four trips daily, hauling low grade ore from the mine to Shasta depot; there it is dumped overhead until the time comes for it to be used.

SIERRA COUNTY.

The Empire mine, Gold valley, will be worked by Manager Buckley. The shaft will be sunk 600 feet, making a total depth of 1000 feet. Electricity will be the motive power.

At the Diadem mine, Forest City, C. A. Higby is sinking a new shaft in the lava to strike the vein on the serpentine contact. In the Oriental mine a long tunnel is being run by M. W. Mather.

W. L. Watts has a bond on the Colombo, or Bullion mine, near Sierra City. Mr. Watts is opening the old lower tunnel. As soon as the tunnel is put in repair and the ore body reached, he will build a mill and put in other mining machinery.

E. F. Harris of Alameda has a bond on the Alice and Papoose quartz mines. J. Schofield is in charge of the work.

SISKIYOU COUNTY.

Owners of the Punch creek quartz mine at Humbug have bonded the claim for \$30,000, to be closed within twenty days or no sale.

At the Wabana mine, Hornbrook, H. Mattern, manager, a 10-stamp mill is almost completed. It is the intention to use oil for fuel.

F. W. Mahler, superintendent Deadwood Hydraulic mine, has had a partial clean-up with satisfactory results. A water-power hoisting derrick and another giant is to be added; larger flumes will be added.

E. D. Baker has bought the quartz mine on Cherry creek recently sold to J. Ironsides; price, \$20,000.

The Yreka Journal hears that a Montana company has bought the copper mine of McVey & Co. at Joe creek, paying \$300,000 for it. This mine is locally considered to be more extensive than the Keswick or Iron Mountain mine in Shasta county; it is situated on the western side of Siskiyou mountain. To develop it thoroughly a railroad would have to be built for connection with the S. P. line.

Prospects for development of the copper deposits in the Siskiyou mountain are bright.

The dredger at Hawkinsville in Yreka creek has been started up again on the opposite side from former workings.

TRINITY COUNTY.

The Brown Bear mine at Deadwood, after a short shutdown to enable some repairs to be made, has resumed.

At Junction City the Cie Fse Co. is closed for the season and cleaning up is in progress.

The La Grange mine will close down for the season next week. A fifteen-day run last month is reported to have yielded \$30,000 in gold.

Mr. Holland is operating his mine on the North fork of Coffee creek. He uses the biggest self-shooter in the world in working the claim.

A Keystone driller is being operated on H. Lorenz, below Douglas City, this season ran water for six months with 250 feet pressure through a 4-inch nozzle. The bank, which is all gravel, is 40 feet high and averaged about 22 cents per cubic yard. The gold is coarse. The Journal says the Sikes M. Co., operating the Bloss

& McClary mine at Trinity Center, have finished their clean-up from a successful season's run.

the flats near the Van Matre ranch in Minersville and the bars for 4 miles will be thoroughly prospected. If results prove satisfactory a dredger will be put in.

The Cleary-Payne-Keenan Co. at Trinity Center has stopped its dredger temporarily while adding new and heavier machinery.

The Chloride mill near Dedrick is nearing completion.

TUOLUMNE COUNTY.

At Jamestown, Superintendent Blakeley will erect a 5-stamp mill on the John Royal mine.

On the eleventh level of the App mine a body of ore 50 feet in width is being opened up. Sixty stamps are operating in the App mill.

The Harvard mine employs thirty men. In the mill no stamps are dropping.

The Magnet says the Eagle Shawmut 100-stamp mill will have its full quota this fall. Two air compressors supply power for drills, etc. There are about 250 men employed.

At Stent H. Moore, superintendent of Mazzeppa mine, expects to erect a 20-stamp mill soon.

The Sonora Independent reports the App mine running steadily, with sixty stamps of the mill dropping full time. At the Dutch mine stoping is in progress at the 1200 level. The 20-stamp mill is running continuously on satisfactory ore from the 1200. The 40-stamp mill at the Rawhide is running day and night, the ore being stoped from the 800; the chlorination plant is also in operation.

Work has begun on the Mt. Hood mine. The shaft will be sunk 100 feet deeper. J. H. Burkhart is superintendent.

At the Shawmut mine 260 men are employed and the 100 stamp mill is running steadily.

The Rawhide G. M. Co. has filed a complaint in the U. S. Circuit Court against the Tuolumne County Water Co. and the Tuolumne County Water & Electric Power Co. for an injunction, accounting and damages. The complaint recites that on March 9, 1898, Nevills, Martin & Ballard entered into an agreement with the Tuolumne Water Co. whereby Nevills and associates transferred to the Jamestown Electric Light & Power Co. certain electrical machinery, pipe lines, wires, etc., from Summersville to the Rawhide and App mines, with a branch line to Sonora, so that the Jamestown Electrical & Power Co. should transfer and convey that machinery and electrical appliances to the Tuolumne County Water Co. by a conditional bill of sale. Nevills and his associates were to receive 40% of the net proceeds each month and credit should be given for all the light and power furnished Nevills and his associates until the full amount of \$150,000 should have been paid. It is alleged further that the respondent sold light and power to outside parties to the extent of \$50,000 per annum and that the actual expenses did not exceed \$6000 per annum. It is alleged also that the respondent has received the sum of \$30,000 beyond its proportion of the said net proceeds. Judgment is asked for the recovery of the possession of the power plant, and an injunction to prevent the respondent from collecting any more money. The defendant's side of the story is not yet received.

In the drilling contests at Stent on Sept. 1st, the double-handed contest, first prize \$100, was won by L. Page and Y. Terzich, who put a hole down in Rocklin granite 28 $\frac{1}{2}$ inches in fifteen minutes. A. Levinsky won the first prize of \$50 in the single contest, drilling 16 $\frac{1}{2}$ inches in the same time.

Near Carters, the Grizzly reaches the 1000-foot level this week. At the Jubilee group twenty men are working; Superintendent C. H. Colpe.

E. N. Ray, superintendent of the Sullivan mine, near Soulsburyville, will put in new machinery. The tunnel at the Lady Washington is progressing. Three shifts of eight hours each are at work with fifteen men. The new mill at the Lost Fox will be finished Nov. 1st.

YUBA COUNTY.

Marysville reports that after twenty years a quartz ledge on Frenchmans hill, near the Marysville and Quincy road, has been rediscovered again. It ought to stay discovered this time.

The Morris ravine gravel mine, owned by Goodall, Perkins & Co., San Francisco, is to be reopened after an idleness of several years.

The Secretary of War has approved the specifications of the California Debris Commission for barrier No. 1, to be constructed above Marysville, and has instructed them to call for bids for its construction. The cost of the work is estimated at \$171,000.

COLORADO.

ARAPAHOE COUNTY.

At Denver, on the 3rd inst., Attorney-General Post filed in the State Supreme Court a reply to the brief of the American Smelting & Refining Co. in the suit brought by him on behalf of the State for the purpose of dissolving the smelter combination. The points discussed are whether or not there is injury to justify the action and whether suit can be brought in the Supreme Court. The Attorney-General's brief contains the following statements: "A corporation organized for the purpose of creating a monopoly is organized for an unlawful purpose and should be dissolved. This corporation has been in existence only three years, and yet with such celerity has it proceeded that it now, as shown by the complaint, has no competition in the State and is supreme in its control of every branch of the metal industry. With a plant of less than \$7,500,000 in cash value, it dominates the entire mining industry of the State and pays a dividend of 7% annually on its stock of \$100,000,000."

CHAFFEE COUNTY.

Manager Goodwin of the New Monarch Co. of Salida says the smelter is in operation.

CLEAR CREEK COUNTY.

The Marshall-Russell tunnel, near Empire station, on the Colorado & Southern Railroad, has been driven 250 feet into the mountain and is reported to have intersected four veins.

Black & Co. of Empire have a lease on the Canova tunnel of the Helen Harold on Wood mountain, and at a point 200 feet from the tunnel mouth have a 19-inch streak of solid ore that carries \$70 per ton in gold, silver and lead values.

At Idaho Springs the Quito is believed to have another rich pocket of ore like the one taken out some years ago, when a place in the stope 16 feet high and 20 feet long yielded \$60,000 over the plates in the 10-stamp mill. An assay made last week from the rich streak gave returns of 347 ounces in gold. It is believed by the foreman that the next shipment of smelting ore will return at least 100 ounces in gold per ton, or a value of \$1 per pound. The product is treated at the Bonetta mill.

The Yankee Con. M. & T. Co. about two months ago began the operation of the Lomhard mine at Yankee, which has been a steady shipper since. Manager Seemann decided to do a little prospecting and has discovered nearly 12 inches of smelting ore that runs \$100 to the ton. The company has let another 100-foot contract on the Manhattan tunnel to J. C. Calhoun of Pine Creek.

Manager Burgess tells the Georgetown Courier that the Saxonia-Ruby tunnel of the Republic Con. Co. shows a 26-foot lode which contains an 18-inch smelting streak, while the rest of the lode is worth \$18 a ton. Assays from the smelting streak yielded \$153 per ton. Officers of this company arrived September 1 from Boston, and Assistant Manager F. H. Collins. It is expected that the holdings of the company will be examined and final action taken for the erection of a mill at the foot of the ore chute.

The Big Forty Co. is advancing its tunnel with air drills under the management of R. M. Snively.

W. E. Renshaw tells the Idaho Springs Gazette that his present intention is to reconstruct the State Ore plant. This will be in the nature of an addition to the Newton mill, which is among the possessions of the new company. The plan is to build a 100-stamp concentrating mill, or to double the present capacity. This will add about 300 tons a day capacity.

Near Silver Plume the Mary Etta group has been examined for Philadelphia men who propose purchasing the property and expending considerable money in development.

Work is now being done on the Terrible property through the silver ore tunnel. Manager Catron is arranging for extensive development.

Idaho Springs reports another strike in the Kinda mine. Manager Crawford has samples of ore which give assays of 332 ounces in gold and 213 16 ounces of silver to the ton. The property is on Fall river. The tunnel is in 550 feet. The streak of ore is 30 inches wide, smelting streak 12 inches, mill ore 18 inches.

Idaho Springs reports a deal by Boston men through E. M. Sabin. The properties are the Ocean Wave group, near Santa Fe.

Two Idaho Springs men have control of the Atlantic mill, at Empire, and will operate it on custom ores.

The Williams Fork M. & M. Co. will operate the Bohtail group of four claims in the northwest corner of this county, at the foot of Jones' Pass. It is on the line of the Moffat Short Line Railway. The mine is developed by a tunnel 350 feet in length, and a contract for another 100 feet has been let. Ore shows in the tunnel for

250 feet, the vein being from 1 to 3 feet wide. The company may erect a 40-ton concentrating mill on the ground.

The Conamara mine, Spring gulch, is being worked under bond and lease. The tunnel, now in 225 feet, will be extended. There is a 6-inch streak of ore in the breast, carrying three ounces gold per ton.

DOLORES COUNTY.

At Rico the Pro Patria mill is running, connected with the Scout tunnel, about 1 mile, by a tramway. W. J. Scout is general manager.

The Atlantic Cable mine is started up by Manager Campbell. The ore runs 35% zinc. They have a zinc mill and a body of zinc ore. Last year they shipped a train of twenty-five cars of zinc to Germany.

The Rico Consolidated Mines Co., under the management of P. S. Rider, is to begin work on several properties.

FREMONT COUNTY.

Near Florence the Spring Hill and two adjoining claims on Ten Mile hill are sold to the Keystone M. Co. Work will be carried on under the supervision of T. A. Mason. The shaft will be sunk 600 feet. The ore is principally copper, carrying gold and silver.

GILPIN COUNTY.

Central City says the Williams lode, in Lake district, is sold to the Williams Mining Co., who will begin active work.

Curnew & Co., leasers on the Chase property, have 25 men at work. The iron ores average 4 to 7 ounces gold per ton. Superintendent Miller has let a contract to run the 300-level workings on the Dacatur vein. The pump being installed, will handle the water so that the lower levels may be drained and miners put to work in them.

At Russell the Frontenac shaft building and plant of machinery were totally destroyed by fire last week.

GUNNISON COUNTY.

At Ohio City a strike is reported in the Chance Gulch, a 3-foot vein that runs well in gold and silver. The Mono mill will treat Granite mountain ore. On the Golden Islet, Manager Lejune has 14-ounce gold ore from this group of eight claims, recently purchased by E. P. Elsworth. The Cortland Co. have straightened out the shaft and are in shape to do economical development work.

LAKE COUNTY.

Near Leadville the Virginus mine has shipped 32 cars of ore to the Saldia smelter. The last car ran 1.79 ounces of gold, 11 ounces of silver and 54% lead, making the ore average nearly \$100 per ton.

A Twin Lakes mine is sold for \$8000—the Simons group, on Mineral hill, in Willis gulch—to O. P. DeFord of Iowa Falls, Ia. The property consists of twelve claims and a mill site.

At Leadville there are a number of mine managers who are awaiting the opening of the manganese market, promised with the completion of improvements at the steel works at Pueblo. Leadville mines used to ship to Chicago steel plants, but with the shutting off of that market on account of freight rates, it was necessary for all manganese to be cut off. There are some small leases on Fryer hill which can produce a scattered tonnage, but the main supply can be made from the Caribou, Coronado, Sixth Street and others of that locality.

T. Rainey will sink on the Boulder group of mines at Evansville 200 feet; shaft, 4½x13 feet.

LA PLATA COUNTY.

Near Durango, the Gold King-Swamp Angel group at Oro Fino has begun development under the management of F. J. Doran.

MINERAL COUNTY.

The output of ore from Creede for the month was 6596 tons.

A new leasing company is organized to work the Nelson claim at Sunnyside, adjoining the Corsair; the discovery shaft is to be sunk 400 feet deeper. The United Mines and Big Kanawha properties show improvement. The mill is handling 150 tons every 24 hours; about 100 tons of crude ore are shipped daily to the smelters. The Humphreys tunnel is being continued northward.

OURAY COUNTY.

The Bonanza group, 2 miles south of Ouray, on Mount Hayden, has been visited by fifteen men from Chicago and St. Louis, who will develop the property. A tunnel is completed to the shaft and another drift run 70 feet on a vein half way down to the shaft; the ore is now exposed for 300 feet. The vein is largely shipping ore, although some milling ore is being saved for treatment when a mill is erected. A 900-foot crosscut tunnel will be started which will tap the ore bodies 1400 feet deep. Fourteen men are employed;

it is the intention to use air drills on the new tunnel.

Ouray reports a strike of ore in the West View workings of the American Nettle. —The Camp Bird mine, under the new management, is making a large output from the developments made by the former manager. The daily yield from the mills is reported to be nearly \$10,000.

PARK COUNTY.

The Maclean G. M. Co. owns the Golden Era group, Mount Loveland; ore goes \$80 gold, 26% lead and some silver per ton.

PITKIN COUNTY.

On the Mollie Gibson and Argentum-Junata properties work has been stopped indefinitely, with no immediate prospect of renewal. The management of the Mollie Gibson is pulling the big pumps from the mine and the water will be allowed to rise from the thirteenth to the tenth level. It will be kept at the latter point for a time at least by the pumps of the Smuggler, adjoining, whose ninth level is on a line with the Mollie's tenth. Work on the Argentum-Junata was suspended in June and it is likely that mine will also remain idle. These properties have always been expensive ones to operate, owing to the immense flows of water encountered, and, being silver propositions, a heavy production was required to enable work to be done at a profit at present quotations for silver. Both these mines have been heavy producers in the past, the Mollie having a record of over \$7,500,000 gross production.

PUEBLO COUNTY.

Announcement is made in Pueblo that the Philadelphia smelter at that point will be closed down indefinitely October 1, by reason of the failure of a certain character of ores used.

SAN JUAN COUNTY.

The Standard says the greatest depth attained on any vein in the county was made last week when the original North Star vein on King Solomon mountain was cut at a perpendicular depth of 2850 feet by the Highland Mary tunnel.

Superintendent Snow will resume operations on Sultan mountain September 10.

The Brooklyn mine, near Chattanooga, averages three carloads per week; values, between two and three ounces in gold and a small amount in silver. During August \$3500 worth of ore was shipped at a cost of \$800; net profit, \$2700.

The Kendrick-Gelder smelter is producing 60% copper matte.

SAN MIGUEL COUNTY.

Near Telluride, at the Double Eagle tunnel is in 80 feet. Manager Litchfield expects to make the property a continuous shipper.

The Butterfly-Terrible Co. has leased all the workings above No. 1 tunnel, the main working level of the upper mine. Leasers will pay a royalty of 25% on the net profits and keep ten stamps in the mill going.

The Hector M. Co., including the Ophir tunnel and the Cimarron mill, has closed down, nearly 100 men being thrown out of employment, owing to a disagreement as to wages.

SUMMIT COUNTY.

The Robinson smelter is to resume. A second furnace is on its way. Manager Buckley expects to have the plant in operation by November 1. The plant is handicapped by the smelter trust, to whom it must sell its matte product. When the Bimetallie smelter was in operation in Leadville before the trust was organized it received \$12 a ton more for its matte product than the Robinson smelter is receiving now.

The Journal says: At Montezuma, the Bullion, California and Silver King keep six four-horse teams busy drawing away the shipping product, consisting of silver-lead ore, and the milling ore is being piled up awaiting the completion of repairs on the Silver King mill.

In Breckenridge four mills are running steadily, viz., the Cashier, Mountain Pride, Washington and Junata, and a fifth, the Hamilton, will be ready to start next week.

J. H. Myers has organized a company to operate in the Frisco and Green Mountain districts. —The Admiral group, near Frisco, is being worked by a new company.

Manager Rose of the Rothschild tunnel, at Argentine, is in over 1200 feet.

At the Cashier, in Brown's gulch, near Breckenridge, Manager Wood has put new machinery into the big mill. A 6-ton crusher is being put in.

Owing to the heavy rains, the Gold Pan placer at Breckenridge and the Oro Grande at Dillon expect to continue sinking to bedrock.

The Hamilton mine and mill on the Swan is in the hands of a syndicate, with H. H. Nicholson of Lincoln, Neb., in charge.

TELLER COUNTY.

The Colorado plant of the U. S. Refining

& Reduction Co. was closed almost all of August.

The railroads running out of the district had entire trainloads of ore on the tracks waiting for transit. The tonnage of the month, if it could be checked up, would prove to be the banner month in the history of the district, but as it was not treated, the mills do not report it. The tonnage for the month figures up to 55,012 tons, the gross value of which amounts to \$1,960,162. The figures as given out by the various reduction plants and smelters are as follows:

	Tons.	Av. Val.	Total.
Smelters.....	13,500	\$50 00	\$ 697,500
Union.....	12,000	30 00	360,000
U. S. R. & R Co.....	12,000	35 00	420,000
Economic.....	4,650	28 00	130,200
Arequa.....	612	13 50	8,262
Dorcas.....	2,800	26 50	74,200
Telluride.....	1,000	30 00	30,000
Portland.....	8,000	30 00	240,000
Total.....	55,012		\$1,960,162

The Zenobia plant will be ready to start September 10. The delay has been taken advantage of by cutting stations at the depth of 200, 300, 400 and 500 feet, and the work of extending the levels away from the shaft is well under way. The new hoisting plants will be good for a depth of 1400 feet. It is the intention to sink to that depth as fast as possible.

The statement of the Golden Cycle M. Co. covers the operations for the first six months of 1902. Operating expenses, \$141,782.82, included \$8793.63 for buildings and new machinery; cost of sinking the shaft 200 feet, \$40 per foot; tons shipped by company, 19,970; by lessees, 1129; gross value of 21,108 tons, \$395,579.90. Proceeds from ore sales and royalties (after deducting freight and treatment charges), \$227,095.35; receipts from other sources, \$341, total, \$227,436.35. Operating expenses, \$141,782.82; \$8793.63 spent for buildings and machinery; net profits for this period, \$85,312.53.

A. Wagner of the Pharmacist Con. denies that there are any negotiations pending for a consolidation of the Pharmacist with the Free Colage, Empire State and the Acacia companies.

C. C. Hamlin, manager Granite G. M. Co. at Victor, says that the production of that mine for August was 1500 tons of average \$30 ore, principally from the fifth, sixth, ninth and tenth levels. The vein opened in the tenth level west of the old vein has been opened in the ninth and eighth levels, where it is equally as good as in the deepest workings, giving a new vein 4 or 5 feet wide that is yielding ore averaging \$30 a ton.

S. R. Guyot is personally in charge of operations under way by the Surety M. Co. on the Denver claim on Howell hill, due south of Stratton's Independence. In the bottom of the shaft 3½-inch drills are used.

Cripple Creek advices are that a 50-ton shipment by La Montague Bros., working a lease on block 8 of the Cameron school section, went about two ounces gold to the ton, mined from the 350-foot level. A crosscut from the 450-foot level should encounter the ore shoot from which shipments are now being made.

Wilson and associates, leasing the Gold Sovereign, have closed a carload shipment that is expected to give returns of two ounces in gold to the ton. They also have a sub-lease from the Cripple Creek Gold Temple G. M. Co.

In expectation of a heavy flow of water with additional development work, the St. Patrick Co., Victor, south of the Gold Coin, has cut a pump station at a depth of 700 feet and will there install a larger pump.

The Practical Leasing Co., operating the Trachyte of the United Mines Co., is daily shipping forty tons; average value, \$25.

F. H. Minard of Denver has a bond on the Santiago group of eleven claims and a mill site in the East Argentine district for \$175,000. He agrees to do a certain stipulated work before May 1, 1903, when the first payment of \$50,000 is due, second payment of \$50,000 due November 1, 1903, the third payment of \$75,000 six months thereafter.

WELD COUNTY.

At Eaton, J. A. Banning of Denver has the contract from the Cache la Poudre Reservoir Co. for building an irrigation ditch, solid rock, 99 cents a cubic yard; loose rock, 34 cents; dirt work, 12.25 cents a cubic yard; total, about \$200,000. The company plans to let contracts for a main reservoir in Boxelder valley, capacity 1,100,000,000 gallons water.

IDAHO.

BLAINE COUNTY.

J. M. Banville, foreman Liberal group of mines, Little Smoky, says that on the Liberal M. Co.'s property the shaft is 350 feet deep. When the 500-foot level is reached the Liberal will have an entirely

new hoisting and working outfit and a mill. The machinery now at the mine was intended to work on the 500-foot level.

The Idaho State Board has placed the value of patented mining claims at \$270.

C. Brewer is reported to have a 60-foot gold ledge near the Mayflower property, at Martin.

IDAHO COUNTY.

Another new mining camp is reported 40 miles southeast of Thunder mountain, near the old Goose Creek placer mines, 25 miles from Custer. About 200 claims have been located.

Thunder Mountain reports that the Dewey mill is running and is saving 78% without the aid of a concentrator, and that the cleanup on the Dewey after two weeks' work was sixty pounds.

OWYHEE COUNTY.

Manager Britt, of the Poorman mines, tells the Nugget that the drift north from the shaft on the 1000 foot level has been running continuously in excellent pay ore for some time past, and has now reached a point 400 feet north of the shaft.

The Silver City Avalanche says the Dewey tunnel has tapped the old Black Jack vein. The Trade Dollar Con. M. & M. Co. has a valuable gold and silver mining property. —The strike in Florida mountain was made August 23. Manager Hutchinson says the vein was tapped 300 feet beneath the old Blaine tunnel. There remains about 140 feet of sinking on the proposed connecting shaft when the tunnel will be complete for the entire 14,000 feet, when the Florida Mountain mill at Dewey will be crushing. The vein has now been developed a distance of 6300 feet.

The Palmer group of mining claims, near Silver City, have been bonded to W. H. Dewey for \$35,000.

SHOSHONE COUNTY.

A Spokane dispatch of the 2d says the fight between the mine owners of the Cœur d'Alene and the smelting trust has reached a crisis and the mine owners have refused to ship any more ore to the trust until a satisfactory settlement is reached. On the 1st the Cœur d'Alene mines, except the Bunker Hill and Sullivan, refused to make any shipments to the trust, and the gage of battle is fairly thrown down. A conference of the miners was to be held at Spokane on the 2d, attended by J. A. Finch and A. B. Campbell of the Standard and the Hecla, E. J. Roberts of the Empire State, Idaho; P. Larson of the Morning, F. Burbridge of the Cœur d'Alene Dev. Co., and R. Wilson of the Mammoth. The conclusion to be reached then is to be of importance. Unless the trust makes concessions it is expected that the mine owners will continue in their policy of refusing to ship their ore. The consequence must be the closing down of the mines unless other arrangements for marketing the product are secured. The mine owners, it is expected, will not continue to put money into extracting ore and concentrating it unless returns can be secured. The conference of the 2nd is a continuation of the recent conference in Chicago, when C. Sweeney, A. B. Campbell and P. Larson discussed the situation without any satisfactory conclusion being reached. The mine owners demand two things. The first and most important is decreased charges for freight and the treatment of their ores. It is generally conceded that the trust is getting profits out of the tariffs charged for freights. The mine owners have at last revolted against the situation. In addition they are demanding an increased tonnage. (No further news of the Spokane conference had been received up to noon on the 5th.)

On this subject and in connection with a project for a lead smelter at Spokane, Mr. T. L. Greenough of the Morning and You Like mines, says that the prospects of Spokane having a lead smelter to treat Cœur d'Alene ores are better than they ever were before. The plant would have a capacity of about 1000 tons a day, and with a refinery would employ from 600 to 1000 men. Mr. Greenough is a partner with P. Larson in the Morning mine at Mullan, Idaho. He lives at Missoula, Montana. He says the mine owners of the Cœur d'Alene have been considering the erection of their own smelters for the past three months, ever since the conference they held in May with the officials of the American S. & R. Co. Relations with the smelting trust are not satisfactory, and the mine owners are considering any means at hand for bettering the situation.

"We have been looking over the advantages which Spokane offers as a smelting site, and they are excellent. There is a down-hill haul to here from practically every mining camp nearby, except Sumpster, Or., and there is a direct road to Republic, which would supply a large portion of the siliceous ore needed to flux the galena. We have been conferring with railway officials with regard to freight rates, and are satisfied they will meet us

in a proper spirit." The committee of mine owners having charge of the matter has had an expert in Colorado for some time, looking over the situation there. It is probable that the output of the Cœur d'Alenes will be distributed, with part going to Spokane and part going to Colorado. The present output of the Cœur d'Alene lead mines is about 12,000 tons of raw ore and concentrates per month. That, however, is on the restricted basis demanded by the American Smelting & Refining Co. If the mine owners build their smelter, the output would probably be increased to 15,000 tons monthly. The outlook for lead is good. A year ago there was a surplus of 50,000 tons on hand. Now that has been practically worked off. The site for the smelter would be fixed by the question of economy, pure and simple. It would be built where it could be operated most cheaply.

Wallace reports another strike of lead and silver within 800 feet of the end lines of the new Hercules. The property is owned by Gilpin, Heyburn & Miller. The Atlas M. Co., with property on Stevens Park, has \$10,000 for development. The force of miners on the Atlas will be increased and a compressor installed.

Two large dredgers will be in operation on the gold properties on Beaver creek Sept. 15.

The Powhattan mine on Big creek has a ledge 2½ feet wide of carbonate ore which assays eighty-eight ounces silver and 5% lead.

Work on the Missoula, east of Mullan, is being pushed with two shifts.

At Wallace is incorporated the Stewart M. Co. to develop and sell ores from the Senator Stewart mine at Kellogg, Yreka mining district. A. M. Strode of Mullan, A. Benicke of Wardner, W. N. Morphy, C. Kalle, N. W. Thornton of Wallace.

Osborn reports progress on the Capitol mine, operated by the Capitol M. & M. Co. Manager Whelan is running a 1000-foot tunnel.

Extensive development is to be done on the Reindeer copper property near Mullan. The tunnel will be extended another 800 feet. Good copper ore is being taken from the face of the drift.

MONTANA.

FERGUS COUNTY.

The Alder Gulch M. Co., E. W. King president, G. Putnam of Chinook treasurer, will work twenty-four claims in that section, including the Putnam & Zortman properties and the Alabama claim. Men will be put to work. A 100-ton cyanide mill is projected.

GRANITE COUNTY.

The Bear Mountain P. M. Co., J. D. Murphy, manager, will work the Pine Ridge placer deposits, at the head of Cayuse gulch, 2 miles east of Garnet.

The Montana G. M. Co. has shipped from its mine, the Sunday, near Phillipsburg, eleven tons of ore, the result of a strike in gold quartz.

The Phillipsburg Mail reports that at Sunrise, near by, at the Sunrise mill and concentrator nearly everything in the ores is being saved daily, capacity seventy tons. The entire district is now practically controlled by the Henderson M. Co., succeeding the Sunrise M. & M. Co. and McLure syndicate. Fifty men are employed. F. D. Brown is manager, C. C. Spencer assistant superintendent.

On Stony creek, 16 miles west of Phillipsburg, on the property of the Michigan & Montana M. Co., J. H. Ortmann manager, an ore body is struck 80 feet from the tunnel entrance. The lead in the upper workings is 4 feet wide; assays average \$45 per ton gold.

JEFFERSON COUNTY.

Fifteen men are developing the Grey Eagle mine. The ore goes to the smelter at East Helena.

The Ada mine is shipping ore to the Colorado smelter at Butte. The mill of the Eva May Co., in Basin, is to be overhauled for a run. D. Sweeney is working the Silversmith mine near Basin. Fifteen men are developing the Buckeye mine near Basin. The mill is running constantly and the concentrates are being shipped to Butte.

MADISON COUNTY.

C. H. Hand, manager Watseca M. Co., near Rochester, tells the Inter-Mountain the Watseca, since 1866, has been worked almost continuously and has been a large producer of gold ore, but up to the time the company took hold of it, in 1893, no work had been done below the water level. Since then a shaft has been sunk 550 feet on an incline and more than 2 miles of underground workings made. Sulphide ore was found at a depth of 350 feet, is 200 feet below the water level, and has continued as far as the mine has been developed, the ore being as rich as the oxidized ore and a greater quantity of it. The vein of the Watseca averages about

6 feet in width, with an average ore streak of ¾ feet in width in the lower workings. Since the company took the property it has extracted about 30,000 tons of ore, average \$26 in gold per ton. The company is preparing plans for a mill, with capacity of 125 tons per day. After the new mill is finished the old mill will be run on custom ore. The present output of the mine is about fifty-five tons of milling ore per day, but twenty tons per day are shipped.

The Abby-Alice M. Co. of Butte is operating the Carpenter claim under lease and bond.

Next to the Watseca in point of production is the Buffalo, owned by E. Mueller of Rochester.

The Thistle lode is developed by a shaft 300 feet deep, with levels and crosscuts to match.

The Longfellow, owned by J. A. Murray of Butte, is under lease and bond to Minnesota parties. The mine has yielded a large quantity of good ore, and under the management of E. W. Merritt of Rochester will become a steady producer.

The Cooper property, owned by Cooper Bros. of Rochester, is developed to a depth of 340 feet. It has a 10-foot vein, containing a 2-foot paystreak. The value of the shipping ore is about 70% lead, \$4 50 gold, sixty-five ounces silver.

MISSOULA COUNTY.

A strike is reported on the Richmond, a copper property near Salters, 20 feet of solid ore while sinking 600 feet.

SILVER BOW COUNTY.

There have been several large fires in and around Butte in the last month, destroying considerable property and temporarily throwing a number of men out of employment. Near that city, on the 31st ult., the entire hoisting plant, pumping station and shaft house of the Alice Con. G. & S. M. Co. was destroyed by fire. Loss estimated at \$100,000, partly covered by insurance. Part of the fire crept down the shaft, but as it was Sunday no lives were lost. The flames spread rapidly, and for a time threatened the mill and smelter and the town of Walkerville.

At Butte the concentrator of the Montana Ore Purchasing Company was totally destroyed by fire; loss, \$100,000, \$60,000 insurance. It will take two months to repair the damage. In the meantime 300 men will be laid off.

At Butte the Parrott mine has resumed operations; about 400 men are at work.

NEVADA.

ELKO COUNTY.

The Dexter-Tuscarora G. M. Co. recently broke down 1700 tons of ore with one blast, the mass having an estimated gold value of \$5 per ton, or \$8500.

ESMERALDA COUNTY.

The Kiondyke mines are situated 14 miles south of Tonopah. The mines are under bond to the Tonopah M. Co., which is doing development work, sinking shafts and inclines. About \$40,000 worth of ore has been shipped by leasers digging where they could find ore that would pay to ship. The main ledge lies between granite on the foot and lime on the hanging wall.

Superintendent Colend, who has charge of the Esmeralda Con. mines, near Hawthorne, is preparing for the erection of a 20-stamp mill and laying 16 miles of water pipe.

EUREKA COUNTY.

Ore shipments by rail from the mines of Eureka district for the week ending August 29 were as follows: Bay State, 21,750 pounds; Eureka Con., 104,040; Jackson, 71,350 From Hamilton: L. Lani & Co., 33,750; Rocco-Homestake, 55,970.

HUMBOLDT COUNTY.

At Kennedy, Wynn & Lasher are daily running through the mill 75 tons ore. They have 60 men at work for the New York company that controls the property. Miners get \$3.50 a day. The nearest railroad point to Kennedy is Lovelock, but two ranges have to be crossed.

LYON COUNTY.

The new mill and concentrator for the Nevada Chief Co. is hauled to the mine at Rockland.

A shipment of a bar of bullion valued at \$6,023.10, of which \$5,790.14 was gold and \$232.96 was silver, is the returns from 265 tons of ore from the Silver Hill mine, worked at the Pollard mill in Silver City; the third shipment made on August account, bringing the yield of the mine for that month up to nearly \$18,000.

NYE COUNTY.

For the quarter ending June 30th the sheriff collected \$5,000 bullion tax from Tonopah mine owners.

The length of the pipe line to bring water to Tonopah from Twin river will be 70 miles, daily capacity 1,000,000 gallons.

At Tonopah the main Mizpah vein is 4

to 8 feet in width, the ore averaging \$100 gold and \$200 silver.

Tonopah reports a strike in the McNamara. The McNamara shaft is 1000 feet from the Mizpah workings. They sunk 200 feet and drifted, and it is said caught the Mizpah ledge.

Water is reported struck in one of the Tonopah mines at a depth of 400 feet. About 1000 gallons a day are being hoisted.

STOREY COUNTY.

The Belcher M. Co. has levied an assessment of 10 cents per share, delinquent Oct. 7.

The Savage mine reports 425 level (from the Gould & Curry tunnel) opening on the eleventh floor of the upraise above the north drift from No. 2 crosscut, in material too low in grade to save. As soon as the top is timbered prospecting from this point will be continued.

The Silver Hill M. Co. has advices of the shipment of bullion valued at about \$6400 in gold, from the cleanup at the mill on August account, making total shipments for that month of over \$11,000.

In the Best & Belcher mine the main raise above the end of west crosscut No. 1 on the 365 level is up 22 feet, without change in the formation. The south drift is out 25 feet. Repairs continue on the 425 level.

In the Utah Con. mine, upraise No. 2 from the south drift from surface tunnel No. 2 is up 23 feet in low-grade ore.

The Ophir M. Co. has received \$4868.18 in gold coin as gross proceeds of the sale of four carloads of ore.

Drill hole No. 2 on the Brunswick lode is down 490 feet and still in porphyry.

WASHOE COUNTY.

At Reno is incorporated the Pyramid Lake M. & M. Co.; C. W. Bidwell, F. O. Norton, F. H. and C. A. Norcross, J. S. Orr.

Oro Fino M. Co.; J. C. Jackson, R. Nelson, R. Peterson.

At Olinghouse, the Crown Point is bonded to C. B. Bell for \$15,000. He has placed D. R. Wilkinson in charge.

Benson & Co. milled sixty tons Jumper ore which went \$30 per ton.

WHITE PINE COUNTY.

A recent strike in Ely, in the Ruth, averages 23% copper. The Ruth shaft is down 275 feet.

NEW MEXICO.

SANTA FE COUNTY.

The First Chance, formerly the Cash Entry mine, near Cerrillos, is being developed by Geo. Whitmore, who will erect a concentrator plant to treat the lead, zinc and silver ores of this and other mining claims owned by the company. The Cunningham Hill mines, near Dolores, owned by S. H. Elkins, are being worked. Free gold is the main ore. The Con. M. and S. Co. are putting men to work in the Blue Bell mines. Carley and Aranda are working the Gold Standard mine near Golden.

J. D. Whitman lately visited the district near Cerrillos, where T. A. Edison has expended \$300,000 in an attempt to catch the fine gold of Cunningham Hill. The Edison works are standing idle and it is locally thought that he has given up the attempt. Cunningham Hill is a noted spot for New Mexicans, as they have been working the dry placers for years. The region covers an area 6 by 12 miles, overlaid with coarse gravel that carries a cement in which the gold is embedded. Many tests gave \$3 a ton by ordinary methods of extraction, but the absence of water makes it impossible to work the deposits on a large scale. The drift carrying the cement can be traced for 200 miles through New Mexico and into southern Colorado.

OREGON.

The Tempest mine is sold to C. R. Alden for \$50,000. He represents the Tempest M. & S. Co. of Spokane. The property embraces four claims in the Greenhorn district.

A placer strike has been made in the vicinity of Geiser. Business men there formed an association to operate a prospecting drill in quest of extensions of the river channel opened in the Winterville diggings. At a depth of 130 feet a pipe-clay bedrock was passed through, and 4 or 5 feet of rich gravel found.

BAKER COUNTY.

The Mammoth mine, Baker City district, has been sold to Michigan men for \$35,000, \$10,000 down. It is 1½ miles east of the Virtue mine.

Manager Simpson, Maiheur G. M. Co., has sunk 100 feet on the vein, and is now crosscutting both ways. The ore in the bottom of the shaft shows free gold.

J. F. Meikle, in charge of the Minnesota Co. at the porphyry dyke, says the property is big enough for 100 stamps, and a mill of that capacity will ultimately be erected. Mr. Meikle is also superintendent of the Goiconda, Craoker creek.

A. C. Roundtree has been inspecting

the Flagstaff mine, where the water is from the 700 to the 500-foot level. From the 260-foot level two veins contain a percentage of free-milling ore, but mostly sulphates. These ores carry slimes. Mr. Roundtree says: "I am satisfied this has been the great trouble with the Flagstaff all along. The people who have attempted to operate the mine did not know how to manage the slimes."

They should have read the MINING AND SCIENTIFIC PRESS, which tells how.

Superintendent Massie of the Mammoth mine has commenced deep sinking. This will be followed by erection of a stamp mill and other necessary machinery.

The Democrat says C. A. Johns has bought the Baisley-Elkhorn mining property for \$4000, subject to a mortgage of \$34,000 and a prior judgment of \$1000. He bought the property at sheriff's sale; the sale was held on a judgment of approximately \$5000. Besides the mortgage and the \$1000 judgment, there are numerous other claims against the property.

DOUGLAS COUNTY.

G. W. Crews has sold his mine on South Myrtle creek to McCarty, Wagey & Co. of Portland for \$15,000. The purchasers intend to put up machinery. The Continental shows plenty that assays \$17 per ton.

SOUTH DAKOTA.

CUSTER COUNTY.

At Custer the Black Hills and Duluth Copper Co. has let a contract to H. H. Francis to sink a shaft 500 feet.

LAWRENCE COUNTY.

The machinery for the 500-ton mill for the Horseshoe M. Co. at Terry, contract for which has been given the Allis-Chalmers Company, Chicago, consists of a separate crushing plant to be built about 500 feet from the 120-stamp mill; the ore to be delivered by rope tramway of railroad cars at the crushing plant, in storage bins, below which are two Gates gyratory rock breakers; the crushed rock and coal delivered to the stamp mill by a 24-inch belt conveyor, so arranged as to deliver the ore at any point in the bins back of the stamps, as may be desired, or the coal in special bins placed in front of the boilers. The power plant for the crushing mill consists of a Reynolds Corliss engine; the 120 stamps each weigh 1000 pounds. The mortars are of special construction, double discharge and so constructed as to make the smallest possible amount of slimes. The power for the stamp mill is in the center of the mill and consists of a Reynolds tandem compound Corliss engine. The stamp countershaft is driven by belt from the engine, 60 stamps being placed on either side of the power plant. The crushed ore is delivered to the cyanide mill, where the product is treated in steel tanks as usual. The entire mill was designed by C. M. Fueller, of Denver, who acted in the capacity of consulting engineer of the Horseshoe M. Co. The mill is designed to be one of the most economical in operation in the Black Hills country, which is noted for its low cost in the treatment of low-grade ores.

PENNINGTON COUNTY.

Twenty stamps of the Keystone mill are being dropped by the Holy Terror Co. on ore from the tenth and eleventh levels of the Holy Terror mine. This ore is being taken from the two deepest levels in the mine. The company is lifting 600 gallons of water a minute out of the shaft, and it is estimated that it would be necessary to handle at least 300 gallons more but for the bulkheads that have been put in to shut off the stream from the abandoned stopes in the mine. There are places in the mine where the water comes in with such force as to indicate that there is an artesian basin at hand, this being revealed by the operations of a diamond drill, below where any actual mining has been done. Several of the holes drilled with the diamond machine proved to be spouters, and to show what force the water would develop 2-inch pipes were put in, with steam gauges attached. One of these showed ninety-five pounds and the other eighty pounds. When the Holy Terror first started its mill it was necessary to pump water from bedrock. Enough water is being pumped out of the mine at present to run a mill of 100 stamps.

TEXAS.

JEFFERSON COUNTY.

Beaumont reports oil is now held at 40 cents a barrel; a further advance is looked for.

UTAH.

BEAVER COUNTY.

The News hears from Copper Gulch of work on the tunnel planned by Samuel Newhouse to afford an outlet for the ores of the Cactus mine. The mouth of the tunnel will be toward the site of the proposed concentrator and townsite in Wah valley, a mile in length, opening the

vein at a depth of 700 feet below the surface at the present shaft, which is now down nearly 600 feet. The initial capacity of the concentrator will be 500 tons, but the intention will be to enlarge it to 1000 tons. It is understood that the Frisco branch of the Oregon Short Line will be extended around the mountain, so that the mill product can be loaded on the cars.

JUAB COUNTY.

Ore shipments from Tintio district for the week amount to seventy-five carloads, divided among the mines as follows:

Uncle Sam.....	5
Yankee Con.....	6
Eagle & Blue Bell.....	5
Bullion-Beck.....	6
Gomul.....	10
Carlisa.....	5
Star Con.....	3
Mammoth.....	8
Grand Central.....	7
Lower Mammoth.....	2
Sloux-Utah.....	1
Dragon Iron mine.....	16
Martha Washington.....	1
Total.....	75

The Mammoth mill sent out two carloads of concentrates and one bar of bullion.

The Utah of Fish Springs has a car of ore; camp assays indicate 60% lead and 114 ounces silver per ton.

PIUTE COUNTY.

Near Kimberly the mill on the properties of the Annie Laurie is in operation. C. I. Rader general manager. The original plant, which was designed to treat 6000 tons of gold-bearing quartz per month, has been enlarged to a daily capacity of 300 tons. The payroll shows 280 persons.

SALT LAKE COUNTY.

(Special Correspondence).—The United States smelter, located at Bingham Junction, are pushing the work as rapidly as possible, but have been delayed in getting material. They intend handling the ores from the United States mine in Bingham and the Centennial-Eureka mine in Eureka, the Bingham mine being sulphide and the Centennial-Eureka high silica ores. The plant will have a smelting capacity of 850 tons of ore. They are using blow engines instead of rotary blowers. There will also be a converting plant. The construction is all of steel and brick. The charging devices, etc., are as mechanical and automatic as it is possible to make them. Electricity will be used in nearly every place in the plant. The slag will be granulated by means of water. A complete equipment of machine shop, blacksmith shop, etc., will be included. The smelter owns its own steel railroad cars. They will also use hot blast in their smelter. They have a sampling mill and are prepared to treat some outside ores in addition to their own. They have two of the largest mines in the State to draw from. The plant will be first-class in every respect and the management have spared no pains or money toward that end. G. K. Fischer of Salt Lake City is the chief engineer.

Salt Lake, Aug. 30.

(Special Correspondence).—The corner stone of the miners' home in Salt Lake City was laid to-day with a trowel made from silver from the Silver King mine at Park City. The miners of Park City presented Mrs. Judge with the trowel.

Salt Lake City, Aug. 31.

The Tribune says connection with the main ore-bearing channel on the property of the Columbia M. Co., at Bingham, has been made through the lower or Cunningham tunnel; samples of rock by Manager Cooke show the presence of native copper.

In the Dalton & Lark group at Bingham a strike is recorded showing 24% copper, fifty ounces silver and \$1.80 gold.

The Cluster M. Co.'s property is the Talco group at Bingham, to be opened up by tunnel under the management of C. A. Talco.

SUMMIT COUNTY.

(Special Correspondence).—The Daly-West mine at Park City are handling 200 tons per day in their concentrating mill. They are operating fifteen concentrators which are handling a product from 6-mesh and the undersize to 200-mesh. The table handling 200-mesh produces one ton per day. F. W. Sherman is superintendent of the mill. The mine and mill employ about 500 men. They have large bodies of ore which will average 55 to 60 ounces silver, 22% to 25% lead, 2 1/2% to 3% copper and about \$1 in gold. They pay a monthly dividend of \$108,000. John A. Kirby is general superintendent.

Park City, Aug. 29.

(Special Correspondence).—The Grand Central M. Co. at Mammoth have started constructing a 4500-foot aerial tramway from the mine to the railroad for transporting ore. The work is being done by

Jones & Jacobs, Salt Lake City agents for Trenton Iron Works. The tramway will have a capacity when completed of twenty tons per hour.

Mammoth, Sept. 1.

(Special Correspondence).—The Wabash M. Co., Park City, has working thirty-five men doing development work, running drifts, sinking a double-compartment shaft 600 feet with single deck cages. The mine has a 12x14 hoist and 18x16 air compressor. G. M. Gillette is superintendent. The Daly-Judge mill are making many changes. They are now handling about 100 tons of ore per day and are increasing the capacity to 300 tons, adding tables, rolls, etc. They have placed an order for part of the machinery. G. H. Elmore of Joplin, Mo., is making some tests on the new Century drop motion jig. The ores are lead, silver and zinc. J. M. Callow of Salt Lake City is testing a shaking screen for fine screening down to 150 mesh. The screens have been in operation at the Cactus experiment plant at Frisco.

The Daly-Judge is cleaning out the mine and old stopes and doing development work. The Anchor tunnel is 6600 feet to the shaft. All of the ore is dropped down to the tunnel level and transported through the tunnel to the mill. The Anchor shaft is down 1400 feet. J. J. Broughall is superintending the erection of the mill.

Prof. Emmons and staff of the U. S. Geological Survey are making extensive investigations in the Park City district.

The Silver King M. Co. are starting up the new Cummers drier for handling the concentrates from the mill. The drier will handle fifty tons per day. They are shipping about forty-five tons of high-grade concentrates daily.

Park City, Sept. 1.

Park City reports the following shipments of ore from the Mackintosh sampler for the past week:

	Pounds.
Daly West.....	3,444,000
Ontario.....	1,036,000
Loring Con.....	160,000
Anchor Con.....	151,000
California.....	18,000

Total.....4,809,000
Silver King.....1,155,180

Grand total.....5,964,180

TOOELE COUNTY.

The Pittsburg & Utah Gold, Silver, Copper & Lead M. Co. has incorporated. The property is located in Ophir mining district; W. B. MacSherry, J. D. Porter, F. C. Hendershot, F. A. Sauer, R. L. Kidner.

(Special Correspondence).—The Consolidated Mercur G. M. Co. at Mercur probably have the largest cyanide mill in the State, if not in the United States. They are handling about 1000 tons of ore per day, employing about 185 men in the mill and 365 in the mine. All the ore from the Mercur mine is transported through the electric tunnel, which runs through the tailings dump and is hoisted into the mill. The incline runs through the mill. All the large buckets are on the main incline and drawn by skips to the mill. The skips hold three tons, which dump into Gates crushers and the material from there goes through coarse and fine rolls. The base ore goes through the roasters and is crushed to about 12 mesh. They have twenty-six leaching tanks, each holding 250 tons. It takes about five days to leach a tank of the ore. They have nine roasters, nine sets of Gates rolls and two Gates crushers. In place of calcining the talcy ore, it is screened out and placed on top of the tanks. Something over one-half of the ore that goes through the mill is base. The DeLamar precipitators are used, as well as the filter presses. They use zinc dust in place of zinc shavings. They have their own refinery and ship hullion that averages 970 fine. They are equipped with their own power plant, in case anything happens to the Telluride Power Co., which supplies them with power. The tailings mill at Manning, owned by this same company, handles about 400 tons per day at a profit of 50 to 75 cents per ton. In treating the ore they use about one pound of cyanide to the ton—as a rule slightly under that—about 3/4 of a pound of soda and 1/8 of a pound of zinc, and it takes about 150 pounds of coal to roast a ton of base ore. They have more ore in sight at present than at any time since the company started to do business. Harry Colhath is superintendent of the mills and George Z. Edwards general superintendent.

Mercur, Sept. 1.

(Special Correspondence).—The process in use at the Sunshine G. M. Co.'s mill at Sunshine, which was fully described in a recent issue of the MINING AND SCIENTIFIC PRESS, has proven beyond all doubt to be a success, and Manager Geo. Moore and Superintendent D. J. Kelly are

to be congratulated on their achievement. They are handling 200 tons of ore per day. Sunshine, Aug. 31.

WASHINGTON.

SNOWHOMISH COUNTY.

At Index a 300-foot tunnel is to be started on the Ethel. The Butte and Boston claims are sold for \$17,000 to the Cascade Arsenic M. Co., which will expend \$2500 in development work. Arsenic ore—the yellow sulphide—is on this property. The company will exploit it for this metal as well as for copper.

STEVENS COUNTY.

Oscar Szontagh, late manager Le Roi smelter at Northport, talks to the Spokane Spokesman-Review as follows:

"The average cost of smelting the ore is about \$3 90 a ton. During July it was \$3.85 a ton. During August it will run a little higher, because of the short supply of ore and the poor coke with which we have been working. The Le Roi Co. is making big money—making lots of money—but it comes from the savings which I have made at the smelter. The ore is of no higher grade. The reports for June and July show profits of \$207,000. Those were profits made by the economies which I effected at the smelter. I have done away with granulating and roasting the matte, and I have avoided many mechanical losses. The plant is running smoothly, and was smelting about 1000 tons a day, with a force of 400 men, as long as the supply of ore kept up.

"The Rossland ore is the hardest to treat that I have ever found anywhere in the world. There is an excess of silica which is particularly difficult to handle. A story was sent out of Rossland that \$40 ore was being sent out from the old dumps. We had one carload of ore from the dump that went \$40. That was all.

"There has been much foolishness written about copper losses at Northport. The records show that the first superintendent, who is a fine metallurgist, had slag losses of from .3% to 1%. Then another took the place, and stories were given out that his slag only showed traces in copper. Such claims were nonsense. As a matter of fact, he was losing from .6 to .8 of 1% copper in his slag, as assays of it now show. I have cut down the slag losses to .36 of 1%.

"The Le Roi ore carries on an average about 1/2 ounce gold, 1.5% copper, and a little less than an ounce in silver. After the losses in smelting are deducted, that means about 23 pounds of copper to the ton. We were paid an average of 7.3 cents a pound for our copper in July. That means about \$1.60 a ton for the copper alone, in the ore. Half an ounce of gold is \$10. With those as average figures, one can easily see that the Le Roi should be making money."

FOREIGN.

BRITISH COLUMBIA.

Kaslo reports a rich find of copper on the Copper Star group, Salisbury creek, near Fry creek, on Kootenay lake. Assayer Neltzel says it runs 75% in copper.

Rossland reports the aggregate tonnage for the week 7463 tons—Le Roi, 4470; Le Roi No. 2, 588; Centre Star, 1470; War Eagle, 720; Giant, 155; Velvet, 60. Total for the year to date, 210,734 tons.

Increases are to be made at once in the crews of the Nickel Plate and the Kootenay mines, now working 75 men.

Grand Forks hears a report from St. Paul, Minn., that men there have an understanding with the Great Northern railway to erect a 1000-ton custom smelting plant near Grand Forks.

THE KLONDIKE.

Dawson reports producing quantities shown by All Gold creek, which was abandoned over three years ago because its pay streak was both uncertain and shallow. This summer has been found a pay streak from 120 to 200 feet wide, 2 feet deep. All Gold creek is 50 miles from Dawson, further distant than any other streams in that direction that have paid well.

G. H. Hees was recently sent to Dawson by the Canadian Manufacturers' Association to make a thorough examination into the business prospects of the Yukon Territory. He has issued his official report, and it is decidedly pessimistic. The total yield of gold last year in the Klondike was \$24,000,000. The production of the coming year, according to the Government estimates, will not exceed \$14,000,000—a falling off of nearly one-half. No new discoveries have been made for over a year, although since 1897 thousands of prospectors have been exploring every creek and mountain in the country. At Dawson, Mr. Hees reports ten applicants for every job, yet boatload after boatload of men continue to arrive, the transportation companies keeping up the illusion abroad that Dawson is the needy man's paradise.

The Mining Congress.

The fifth annual session of the International Mining Congress met at Butte, Montana, on the 1st inst. In deference to the Labor Day celebration the Congress took an adjournment from 10 o'clock, the time announced for the morning session, until 2 o'clock P. M.

When the Congress assembled at that hour there were 200 delegates present, more arriving on all trains. Governor J. K. Toole made an address of welcome on behalf of the State, Mayor Davey on behalf of the city of Butte, and former Governor J. E. Rickards on behalf of the Business Men's Association of Butte. E. L. Shaffner, president of the Mining Congress, spoke as follows:

I believe that by the wise deliberations and enactments of this honorable body; by the scientific discussions to be held here, and by the practical object lessons taught by this great display of the mineral resources and opportunities of your wonderful State, an influence will be created which will never cease to operate to the interest of Montana. We accept your hospitality so generously offered and assure you that the feelings which prompt it are both appreciated and reciprocated.

Perhaps, in view of the many new members before me, I may be allowed a word to the Congress in emphasis of one or two points expressed in the president's annual call.

First as to the origin and aim of this body. The International Mining Congress was forced into being through a recognition of certain necessities and abuses existing in our mining laws and practices. These necessities, which are apparent to all interested in mining, are tolerated by our national Government, we believe, through its ignorance of and lack of proper means for investigating mining interests. The conviction also prevails that the great mining population of our own and other countries, laboring under the disadvantage of remoteness from the great business and political centers, might, through the united efforts of representatives of the various sections interested, advance the interests which all miners hold in common. These announcements early crystallized into a demand for a separate department in our national Government, which should be devoted to scientific research and experiment and to the collection of information valuable to the mining industry, and whose head should be made a member of the President's Cabinet. The assertion that such a department is not needed, and would prove a useless expense to the country, does not need to be disproved to any who have watched the immense growth of the mining industry during the past five years. The parallel case of the creation of the Department of Agriculture has already been cited before this Congress.

During the past winter a bill for the creation of a department of commerce and labor was introduced into the House, having a bureau of mines and mining included in its specifications. Believing this great industry deserved a larger recognition and demanded more attention than could be obtained through a mere bureau, our committee earnestly protested against such a bureau and succeeded in having it eliminated from the pending bill. And through Representative Wood of California a counter bill was introduced, providing for the creation of a department of mines and mining. So well was this bill supported that it was at length agreed that a committee composed of representatives from the different departments and general government be appointed to investigate the whole matter and consider what bureaus could be dropped from the proposed department of commerce and labor without loss to the industries represented.

Increased interest was shown by the delegates to the Mining Congress, on the 2nd inst. and the attendance was more than double when the session was called to order.

Committees on credentials and permanent organization were appointed. There were five addresses given on the 2nd by W. H. Frazer, Waldemar Lindgren U. S. Geological Survey; C. M. Reeves, of the mining department of the Louisiana Purchase Exposition; E. Dale Owen and Mrs. E. Haskell.

Mr. Lindgren, after tracing the formation of the gold-bearing veins, submitted figures showing the output of gold in North America, from the time of the discovery up to 1900 the United States producing \$2,360,000,000 of gold; Mexico \$181,000,000, and British America \$142,000,000. He said: The most important gold belt in North America is that stretching along the Pa-

cific Coast. Throughout this stretch of country the gold veins are accompanied by great development of the placers and by far most of the gold has been obtained from the placers. California has yielded from this belt \$1,300,000,000; Oregon \$55,000,000; British Columbia and Northwest Territory, \$120,000,000, and Alaska, \$31,000,000. During 1900 the belt yielded \$55,000,000. If no further discoveries are made in this region, it is the belief that these figures will rapidly decrease. California's output will doubtless be maintained at the present figure for many years to come. It is believed that increased quartz mining will in some measure compensate for the loss in the gold production.

W. H. Frazer said:

"The man who locates a mining claim and goes to work upon the same for the purpose of developing should have a fair knowledge of mineral beds or hodies and the indications which point to him the place where such ore bodies may be found. "The days of luck in mining operations are past and the man who to-day makes success of mining venture or investment must know the laws of mineral nature and have a keen intelligence of mining operations, else he goes the way of failure and becomes a deterring instrument to all advancement in the community and State in which he lives.

"It is intelligent mining that has made the mining States of the West the bulwark of the national treasury. It is intelligent mining that has placed \$1,250,000,000 worth of gold into the hands of the people of the United States, more gold by \$500,000,000 than is owned by any other nation on earth, and this bulwark will last for ages hence, for there are yet billions of the yellow metal stored away in the silent treasure houses of the Rocky Mountains and it is being watched and guarded by an intelligent and patriotic people who believe in the advancement, in the development and stability of their country."

On the 3rd inst. the convention resumed deliberations. A. A. Bell, of Montana, introduced a resolution providing for general organization of the men interested in mining to be known as the International Mining Association, the present congress to be merged into the same. Referred to committee.

The committee on resolutions recommended that the resolution introduced by S. L. Dignowity of Utah indorsing the Kearns bill providing for the amendment of sections 2322 of the revised statutes; to do away with extralateral rights, to indorse only the first part of the bill providing for the abolishment of extralateral rights now in force.

Dignowity asked that his resolution receive immediate attention. Delegate Martin of South Dakota explained that the idea of the bill was to change the law of the apex so that a locator would own the surface of the claim and all within the end and side lines extended downward. He contended that the subject of extralateral rights had been fruitful of litigation.

Delegate Joseph of Utah was opposed to the resolution. He said it gave the prospector fifty-two and a half acres and it did not limit his possession in a mining camp and would shut out a great deal of prospecting. The evident purpose of the bill, he declared, was to throttle prospecting and give everything to the capitalist.

Dignowity, author of the resolution, said that he could not see where the proposed law could injure the miner or locator. They could take up 1500 feet square and locate as many claims as they liked. He said the abuses benefited the lawyers and not the miners. The present law originated with the millionaires, and he referred to the owners of the Comstock, whom, he said, located the apex and drove anyone else out.

The question of the apex has been the bone of contention in the endless litigation in which the big mines of Butte have been involved and is one of the principal subjects for consideration by the mining congress.

Five papers were given to the congress on the 3rd. Walter H. Weed of U. S. Geological Survey spoke of the "Geology of Butte," J. A. Holmes of the mine department of the St. Louis exposition delivered an address on the value of exhibitions in promoting the mining industry. J. E. Spurr, U. S. Geological Survey, spoke on "The Application of Geology to Mining," Mrs. F. L. Holland of Galena, Ill., on "Our Present Need—A Department of Mining," C. P. Repath of the Washoe smelter at Anaconda illustrated his lecture. His subject was "Mechanical Engineering—A Factor in the Development of Modern Copper Smelting."

On the 4th an effort to indorse the Kearns bill, providing for a change in the mining laws of the country so as to establish surface claims and do away with extralateral rights was defeated by a vote of 95 to 3, the States voting in the affirma-

tive being California and Missouri. A resolution to the effect that the Congress go on record against the Kearns bill, and to send a recommendation to Congress that the bill be not passed, was carried.

L. B. Prince of New Mexico, who is not in attendance at the session, sent in the following resolutions:

"Resolved, That the magnitude and importance of the mining industry, which has reached over a billion of dollars of annual product, calls for the establishment of a national department of mining, the chief officer of which should be a member of the President's Cabinet;

"Resolved, That the Congress of the United States be respectfully requested to provide by law for the location and working of mines of the reserved minerals, gold, silver and quicksilver, and Spanish and Mexican land grants."

These resolutions were passed.

Personal.

M. L. REQUA is visiting Eureka, Nev.

F. M. SMITH is assistant manager East Helena, Mont., smelter.

W. Z. KINNEY has returned from Reno, Nev., to Silverton, Colo.

A. A. STEEL is now assistant superintendent Pyramid, Nev., M. Co.

N. T. TREGAR is visiting Baker county, Or., mining properties.

GEO. P. HYDE is superintendent smelter Con. M. & S. Co., Cerrillos, N. M.

R. C. McCAFREY is manager Santa Fe G. & C. Co. San Pedro, N. M.

J. W. HAAS has returned from San Francisco to Mineral Park, Arizona.

E. L. HOLLINGSHEAD has charge of the Rankin Milling Co. at Pollock, Idaho.

W. A. CLARK has returned from Jerome, Ariz., to Butte, Mont., via Salt Lake City.

J. W. CHANDLER of Midas, Utah, is inspecting mining property at Colfax, Cal.

B. DOWLING of Virginia, Nev., has been appointed cupeller of the mint at Carson, Nev.

JAS. H. KNOWLES is superintendent Maravilla Copper Co., Solomonville, Arizona.

H. MOORE, Supt. Mazeppa mine, has returned to Stent, Cal., from San Francisco.

J. B. OVERTON, founder of Overton, Nev., has returned there from San Francisco.

P. BOUERY, superintendent La Grange mine, Junction City, Cal., is in San Francisco.

CHARLES CRISMON is superintendent Utah Co.'s property, Fish Springs, Utah.

R. D. WILLIAMS succeeds Superintendent Underwood at Carisa M. Co., Tintic, Utah.

WALLACE MACGREGOR left Massachusetts yesterday for Costa Rica on mining business.

N. B. KNOX, of San Francisco, is examining mining property at Kendall, Montana.

H. ELDBREDGE, metallurgist Grand Central of Tintic, Utah, has returned there from Idaho.

A. E. BRUCE has resigned his position as chief clerk Shannon Copper Co., Clifton, Ariz.

A. E. CHODZKO has moved his office from 12 Front St. to 519 Mission St., San Francisco, Cal.

C. S. KEYES, president New Mexico School of Mines, Socorro, has returned there from Santa Fe.

H. M. ATKINSON succeeds P. O. Perley in the management of the New England Co., Bingham, Utah.

J. A. TEAGARDEN of Boulder, Colo., is visiting Reno, Nev., with a view to investing in mining property.

W. H. ADAMS, of New York City, is in San Francisco from an Alaskan examination of copper property.

B. J. TREWEEK, Lead, S. D., is at Bluefields, Nicaragua, erecting a stamp mill for an English company.

J. L. WAGGONER, superintendent Bonnie Bee mine, has returned from San Francisco to Colfax, Cal.

A. HORN, mine manager the Kwandang-Soemalata M. Co., has arrived at Soemalata, North Celebes.

T. B. WHITTED, for five years connected with the General Electric Co., of Denver, Colo., resigned September 1.

JOHN REUTER is manager of the Goram M. & M. Co., working the Smuggler-Almont group, Dunton, Colo.

T. GARNIER, superintendent of the Osceola mine, Alleghany, has returned there from Los Angeles, Cal.

W. A. HEWITT of the Compressed Air

Machinery Co. has returned to San Francisco from southern California.

E. H. BENJAMIN, secretary California State Miners' Association, has returned from Oroville to San Francisco.

J. B. RANDOL, former manager New Almaden, Cal., quicksilver mine, has returned to the East from San Francisco.

BERNARD MACDONALD has returned to Rossland, B. C., from an inspection of mining property at Berner's Bay, Alaska.

F. W. HOAR, superintendent Old Dominion C. M. & S. Co., has returned to Globe from Clifton and Morenci, Arizona.

W. F. ZIMMERMAN, vice-president and general manager St. Lawrence Power Co., has resigned, to take effect September 1.

RICHARD THOMAS, foreman Malakoff hydraulic mine at North Bloomfield, Cal., has resigned. He is succeeded by M. Doyle.

COL. J. A. OWNBEY will manage the development of the mining properties of ex-Sec. of the Treasury Gage in Boulder county, Colo.

GEO. S. SCOTT, Eastern manager MINING AND SCIENTIFIC PRESS, has returned to New York City from a week's sojourn in San Francisco.

GEO. MOORE, of the Sunshine, Mercur, Utah, has gone East to arrange for another set of filter presses to handle increased volume of silmes.

J. B. BALCOMB of Heald's School of Mines, has returned to San Francisco from examination of some mining property in Johnsville, Plumas county, Cal.

H. W. FELTON, W. H. Young, J. D. Sword and J. Rearden have gone to Mazatlan, Mex., to examine a gold-bearing property that the former controls.

N. J. MARTIN, who recently resigned the superintendency of the mines of the New York & Honduras Rosario M. Co. at San Juanito, is at his home at Lewiston, Idaho.

L. T. WRIGHT, general manager Mountain Copper Co., Keswick, Cal., has gone to England for two months. W. L. Cole is acting as manager during Mr. Wright's absence.

THOS. KAVANAUGH now has charge Troy-Manhattan C. Co.'s property at Troy, Arizona. Manager C. H. Cutting has transferred his headquarters to New York City.

O. SZONTAGH has resigned the management of the Le Roi smelter at Northport, Wash. A. W. Watson, late foreman of the plant, succeeds to the post of metallurgist.

P. WISEMAN, general manager Shannon Co., Clifton, Arizona, has resigned his position. The business of the company is temporarily looked after by Thompson and Anderson.

C. O. BAKER, JR., of Baker & Co., platinum refiners of Newark, N. J., has been appointed a director of the National Bank of that city, one of the strongest financial institutions in New Jersey.

A. LOVELL, superintendent motive power Northern Pacific Ry., has resigned and accepted a position with the Santa Fe Ry. as assistant superintendent motive power, headquarters at Topeka, Kan.

A. HOULE, for the past year smelter superintendent for the Old Dominion Co., Globe, Arizona, has resigned to accept a similar position with the North American C. Co., Grand Encampment, Wyoming.

A. K. STUART, who had charge of the mineral section of Canada's exhibits at Paris, Glasgow and London, during the last two years, will have charge of the Canadian mineral exhibit at the St. Louis Exposition.

W. N. RYER, formerly associated with the Crescent Steel Co. as traveling salesman, has a similar position with the Midvale Steel Co. of Philadelphia, represented at 220 Market St., San Francisco, Cal.

W. C. RALSTON is nominated as joint Senator from the Tenth California Senatorial District. State Legislatures need just such miners as Mr. Ralston, men with ability to faithfully and intelligently represent the mining industry.

W. I. RAND, associated with the Massachusetts School of Technology, is in Arizona to get a mining property worthy of extensive promotion, and is said to have found what he wants near the Jack Rabbit mine, 25 miles south of Casa Grande.

GEO. HAWKINS and R. B. Shaw of the topographic branch of the U. S. Geological Survey, are in the Copper City and Delamar country, Shasta county, Cal., gathering data and statistics for a special sheet and article on the topography of that section.

H. L. KOPP, of Sonora, Cal., is in Chemulpo, Korea, to erect an 80-stamp mill for a mining company. With his brother, Fred, he sailed from San Francisco May

1st, and 41 days were required in making the voyage, stops being made at Honolulu, Yokohama, Tokio and Kobe.

J. F. PARKS has resigned the superintendency of the South Eureka mine, Amador county, Cal., which position he has held ever since the company started. His duties at the Kennedy mine require his undivided attention. The resignation took effect Sept. 1. John Truscott succeeds him.

Commercial Paragraphs.

JONES & JACOBS, Salt Lake City agents for the Trenton Iron Works, have an order from the Centennial-Eureka mine at Eureka, Utah, to double the capacity of their tramway at the mine.

THE machinery for the 120-stamp mill for the Horse Shoe M. Co. of Deadwood, S. D., has been awarded to the Allis-Chalmers Co., Chicago, Ill. This mill is expected to handle 1000 tons of ore per day.

THE Yaqui C. Co. has ordered from Roy & Titcomb, Nogales, Arizona, two boilers, a pump, an engine and a machine drill. Roy & Titcomb have the contract for the structural steel in the new penitentiary at Hermosillo, Sonora, Mexico.

THE Jessop Steel Co. of England is building a large steel plant at Washington, Pa., in which electrical power distribution will be employed. The company has recently purchased a considerable amount of direct-current apparatus from the Westinghouse Electric & Mfg. Co.

THE official report of Russia's foreign trade for the first four months of 1902 shows the American importations to be virtually the same as in 1901, apparently indicating that Russian buyers have become fully convinced it is better to buy American machinery, in spite of the discriminating duty against it. The comparative figures for 1900, 1901 and 1902 are respectively \$3,980,000, \$7,158,000 and \$8,913,500. In the meantime German and British imports have fallen, their figures being \$34,061,500, \$32,216,500 and \$30,297,000 and \$15,064,000, \$14,317,000 and \$10,394,000. The whole import has continued falling, so that the share of America is relatively larger than in 1901. The exportations continue to increase.

Catalogues Received.

Bulletin No. 29 of the Northern Electrical Manufacturing Co., Madison, Wis., treats of motors, and its thirty-two pages 7x10 inches are as interesting in that line as anything received at this office for some time. The pictures talk, and the letter press tells just about what additional an inquirer would want to know. If Mr. Goe would only make that brochure No. 29 6x9 inches, it would be rated 98 A.

"Established 1868," is the sole statement on the back cover of the most recent catalogue of the Robert Atchison Perforated Metal Co., a good announcement to be able to make, for thirty-four years of successful operation speaks well for any business concern. Perforated metal is the sole subject, an interesting one to many. The booklet will be sent on request. The company's Chicago address is 305 Dearborn St.

Obituary.

FELIX CHAPPELLET, a well-known pioneer California miner, passed away at his home in Oakland, Cal., on the 27th ult., aged 74. He had mined in California for 50 years, and was most prominent of late years in connection with drift mining, in which he achieved deserved success.

Recently Declared Mining Dividends.

Payable.
Bunker Hill & Sullivan M. & C.
Co., Idaho, \$9000..... Sept. 5.

THE CALIFORNIA DEBRIS COMMISSION having received applications to mine by hydraulic process from J. A. Modglin, in Black Hawk Mine, near Grass Flat, Sierra County, Cal., draining into tributary of Slate Creek emptying into North Fork of Yuba River; from J. G. Johnson, in McCabe Creek Mine, at Enterprise, Butte County, Cal., to deposit tailings in McCabe Creek draining into South Fork of Feather River; from C. L. Canfield, in Shady Creek Mine, at Shady Creek, Nevada County, Cal., draining into Shady Creek emptying into South Fork of Yuba River; from Reamer Consolidated Mining Co., in Green Spring Mine, near Forest Hill, Placer County, Cal., to deposit tailings in Oro Canyon draining into Middle Fork of American River; and from Reamer Consolidated Mining Co., in Baltimore Mine, near Forest Hill, Placer County, Cal., to deposit tailings in Dardanelles Canyon draining into Middle Fork of American River, gives notice that a meeting will be held at Room 36, Flood Building, San Francisco, Cal., Sept. 22, 1902, at 1:30 P. M.

WANTED TO DISPOSE OF
A Quantity of Brass and Steel
Wire Battery Screen.

Address Box 66, care Mining and Scientific Press.

MINING AND SCIENTIFIC PRESS

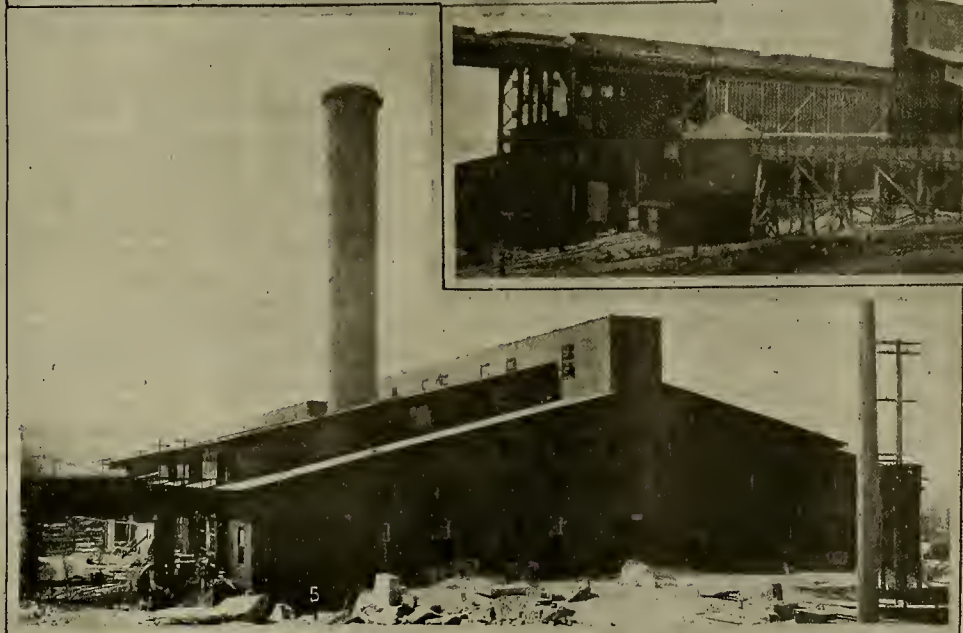
Whole No. 2199.— VOLUME LXXXV.
Number 11.

SAN FRANCISCO, CAL., SATURDAY, SEPTEMBER 13, 1902.

THREE DOLLARS PER ANNUM.
Single Copies, Ten Cents.



HEREWITH appear engravings of some of the more prominent structures referred to on pages 143, 144 and 145 by C. H. Repath in his paper on "The Mechanical Engineer a



Factor in Modern Mining, Milling and Smelting." The engravings on this page are from photographs furnished by Mr. Repath and have not been published anywhere before. No. 1 shows the briquetting plant of the Washoe Co.; No. 2 depicts blast furnace building of the same company; No. 3 the Leonard hoist, Butte, Montana, one of the newest developments in Montana mine head gear; No. 4 the concentrator building of the Washoe works, and No. 5 the reverberatory building of the Washoe Co.

MINING AND SCIENTIFIC PRESS.

ESTABLISHED 1860.

Published Every Saturday at 330 Market St., San Francisco, Cal.
TELEPHONE, DAVIS 771.

ANNUAL SUBSCRIPTION:

United States, Mexico and Canada.....\$3 00
All Other Countries in the Postal Union..... 5 00

Entered at the San Francisco Postoffice as second-class mail matter.

Chicago Office (Telephone, Harrison 73).....737 Monadnock Block.
Denver Office (Telephone, Olive 733).....606 Mack Block.

J. F. HALLORAN.....Publisher.

San Francisco, September 13, 1902.

TABLE OF CONTENTS.

ILLUSTRATIONS.—Some of the Smelting Structures at Butte, Mont., 140. Mining and Metallurgical Patents, 149.

EDITORIAL.—The Mining Congress; Some Practical Papers; Something New in Rock Drilling; Much Prospecting This Season; Applicants for Patents, 141.

MINING SUMMARY.—150-151-152-153-154.

LATEST MARKET REPORTS.—17.

MISCELLANEOUS.—Concentrates, 142. The Mechanical Engineer's Factor in Modern Mining, Milling and Smelting, 143-144. Application of Geology to Mining, 145. First Aid to the Injured in Mining Accidents, 146-147. The Value of Topographic Maps; Comparative Cost of Air Compression; Platinum Anodes, 148. Mining and Metallurgical Patents; Ore Roaster Decision; Oil Fuel for Ocean Steamships, 149. Personal; Commercial Paragraphs; New Patents; Notices of Recent Patents; Books Received; Catalogues Received, 154-17.

The Mining Congress.

The fifth annual session of the Mining Congress held at Butte, Mont., Sept. 1-5, had its chief value in the opportunity it afforded the visitors to see the most important mining town in the country, and in its being the occasion for the preparation of four papers, presented in full in this issue. It rejected a resolution endorsing the Kearns bill, doing away with apex and extralateral rights, and endorsed a recommendation to Congress for the creation of a Cabinet Department of Mines and Mining. It decided to call itself in future the "American Mining Congress," to hold its next annual convention in Deadwood and Lead, South Dakota, and elected the following officers: President, J. H. Richards, Idaho; first vice-president, S. W. Russell, South Dakota; second vice-president, E. R. Buckley, Missouri; third vice-president, T. E. Ewing, California; secretary, I. Mahon, Pennsylvania; treasurer, C. W. Goodall, Montana; executive committee—J. T. Armstrong, Washington; G. T. Grayson, Oregon; W. M. Kendall, Ohio.

While the standard of criticism by which such an assemblage is to be judged must necessarily be an elastic one, it is manifest that the Congress did not rise to its opportunities and was in some respects as much of a failure as its Milwaukee predecessor. The mental horizon of some of its members seemed limited. With courteous gallantry that may be admired, though it cannot be commended, the hundred delegates permitted a lady member with six votes to hold them up in parliamentary entanglements for two days. There seemed to be a lack of business capacity and the breadth that should characterize the deliberations of such a gathering was apparently absent.

The Congress stultified itself in turning down Senator Kearns' proposed mining law without even proffer of amendment, while endorsing the movement for a Cabinet Department of Mines and Mining. The one embraced and necessitated the other. To reject one and endorse the other was like resolving to build a house, but in the same breath declaring that the house must have no foundation. It might have walls, and even a roof was admissible, but a substructure was inadmissible.

The local newspapers published in the greatest of all western mining towns where the Congress was held are edited by miners, read by miners, and correctly represent how real miners look at some of the antics of the Congress, a sort of gently amused air pervading their kindly criticism.

However, when one considers the possibilities of such a body, one must only admire its moderation. The Congress needs more miners, some practical men with practical ideas, and less lady parliamentarians and essayists. A pink tea is a lovely function, but a miners' congress can not well be grafted thereon, though to use the word graft in any connected capacity would only tend to create considerable hilarity on the back seats.

The State of Montana and the city of Butte made splendid reception, but the fact is painfully manifest that the Congress in its actions was not wholly rep-

resentative of the real miners; the men who do things and do them right.

If the "American Mining Congress" can take lesson from the mistakes of its predecessor it may do some good, but so far it has not shown much right to pose as the representative of the interests of the American miner.

This paper would not be understood to speak disparagingly of the Congress, nor of the delegates; it has always been friendly to the spirit and stated purpose of the organization, and would be pleased to commend while it hesitates to condemn. "Kindly are the wounds of a friend," and in all kindness the belief is expressed that a congress to rightly represent miners should be more largely composed of mining men.

This paper believes that an "American Mining Congress" could do good. In this belief suggestion is made that the best measure of good could be secured by making it thoroughly representative, not by allowing the belief to go out that a nondescript gathering not really representing the miners can take conclusive action on such a serious subject as the revision of the U. S. mining statutes, but by having made up of real representatives of the mining industry. It would be well for each mining State to have a mining association, each State mining association to elect delegates to the mining congress; these delegates, and those only, to constitute the mining congress. Then it would be an American Mining Congress in fact as well as in name. The movement may work out this way. The idea is commended to general attention.

Some Practical Papers.

In this issue appears in complete form four of the papers read at the Sept. 1-5 meeting of the Miners' Congress at Butte, Montana. They are given publicly because they are believed to be practical and of interest to the miner and metallurgist. This is not meant to be in any way condemnatory of the many fine essays and articles, speeches and addresses at that gathering, but which though admirable in style and composition do not give much information. In this regard the MINING AND SCIENTIFIC PRESS suffers from an embarrassment of riches, as the mass of material furnished from that meeting for publication transcends our powers of immediate reproduction.

Mr. Repath's paper will be considered by many as the most noticeable of all elicited by the occasion. The title of the paper by no means indicates its contents, which embrace a historical resume of Montana smelting operations. To many the chief charm of Mr. Repath's paper is the standpoint from which it is viewed—that of the mechanical engineer. This is believed to be new. Like metallurgists, however, he is optimistic and progressive. That sentence is particularly worthy of note where he says: "The time is not far distant when all the boiler power required to run a whole smelting plant will be generated by the waste gases from the furnaces, utilizing the heat from the sulphur as well as the gases used from the coal used in smelting the ore." The general trend of metallurgical progress is in line with the bold prophecy. The article will be read with interest by all interested in any way with smelting the world over.

The address was illustrated by about 100 stereopticon views, especially prepared for the occasion. On the front page appear five half-tone engravings of some of the surface plants of the Washoe and Boston and Montana companies at Anaconda and Butte, Montana, not heretofore published, from photographs furnished by Mr. Repath in connection with the article.

Another paper, read by Dr. G. W. King, of Helena, Mont., is also published in full, which, while not telling anything new or notable, is of sufficient value to mining men to warrant such publicity. The wording of the article by Dr. King might be condensed a little without injury to the topic, but the ideas and practical suggestions make the article of real value to every mining man in any capacity, whether on the surface or underground. We believe the article could be read with profit by every one connected in any active way with the work of mining, and publish it verbatim, knowing that in no way could greater publicity be given to it among mining men than by its appearance in this journal.

It is believed that in every mine of any consequence it would be good business—purely as a business proposition—to organize a small corps of trained men whose business in case of accident or personal injury would be to take care of the injured and afford relief till the doctor or surgeon arrived. Every miner will recall from his personal experience an instance where prompt aid would have saved considerable suffering and even life itself. Men who have kept records of mine accidents tell us that the majority of the underground accidents that befall miners happen to them when moving about from one part of the mine to another. The miner actually at work seems less liable to injury than when he is going around the mine. The idea of having a sort of hospital corps on a scale commensurate with the size of the mine and number of men employed might well commend itself to the favorable attention of those most directly interested in keeping down loss of life or limb as much as possible.

The application of geology to mining is a topic that was well handled by J. E. Spurr of the U. S. Geological Survey.

Ever since 1775, when Werner was appointed professor of mining at Freiberg, there has been a great amount of practical value furnished the miner by the geologist, down through the days of Dana, Lyell, Wilkinson, to Le Conte and Van Hise, not alone in indicating where valuable mineral deposits may be found, but in the almost equally valuable work of showing where it were useless to look for certain minerals.

In this "application of geology to mining" it is to be borne in mind that there is or should be an application of mining to geology. Some geologists, and possibly, some miners, overlook the fact that mining is the parent of geology; that mining can help geology, probably more than geology can help mining. Mining can help geology by furnishing material upon which the geologist can found the principles of his science; it can also help by placing at the disposal of the geologist the observations directly gained by those actively employed in mining. Mine managers and others can help the geologist just as much as he can help them. Geology can sort and systematize the data as received and think out important truths, that might not occur to the miner, thus both giving mutual aid of common value each to the other, both miner and geologist working together for the common good and, incidentally, advancing science.

Mr. Chapman's paper on the use of topographical maps is timely and to the point. Like the others published it is practical, and hence finds place.

SOMETHING new in rock drilling for deep holes is reported from Frankfort, Germany, where Howarth and Walski have a device for utilizing the flushing water instead of the boring rod to convey motive power to the horer, the boring being done by a hydraulic motor attached to the bottom of the rods, water under pressure being forced through the hollow rod to the motor, the escaping water doing the flushing. The engineers mentioned say that with a drive pipe and piston 2 inches in diameter and a working pressure of 170 pounds, the test motor gave twelve strokes per second, consuming 1.1 gallons of water, and that the 8-inch bit drilled through hard sandstone at the rate of 26 inches per hour; in soft sandstone at the rate of 23 feet per hour.

APPLICANTS for patents must make entry on all mining claims within the year ensuing in which the period of publication terminated. In the past the rule was that entry could be made "within any reasonable time," which permitted some applicants to come in with their entries several years after publication had expired. But now in the event that the entry is not made in the calendar year, the applicant's entry is void. All questions as to the annual expenditure upon mining claims are not for the determination of the Land Department but of the courts.

A GREAT DEAL of prospecting is being done this season, from the homely grubstake proposition to the elaborate outfit of the monied prospector. Local papers are chronicling strikes and discoveries in all parts of this great region where is still the prospector's domain. The horseback prospector is not so much in evidence, slower, surer examination of possible mineral ground taking the place of the men who once hurriedly rode over an area, looking only for gold or silver.

Concentrates.

A CROSSCUT tunnel rarely cuts a vein in pay.

SNOW to the depth of 30 feet is not uncommon in the Sierras and Rocky mountains.

PROSPECTING AND MINING are permitted within U. S. Government forest reserves.

It is ordinarily a good rule never to buy stock in a corporation that pays an unearned dividend.

SALAMMONIAC is made from the ammonia water of gas works by the addition of hydrochloric acid.

REMOVING the bark from mine timbers lengthens the life and increases the efficiency of the timbers.

THE existence of sulphide of gold in nature is a question of some doubt. It has never yet been isolated from any of the ores.

TIN is found in at least two localities in the United States: Temescal, California, and Bear Gulch mining district, South Dakota.

CINNABAR can be produced artificially by the action of a superheated solution of alkaline sulphide on the black amorphous sulphide of mercury.

ARGENTINE is the richest of the silver ores, but it is found mixed up with sulphides of other metals. Mixed with galena it forms what are called silver-lead ores.

THE bromine process of gold extraction was tried at the Nellie Bly mine, Boulder, Colo., a detailed description of which appeared on pages 205 and 206 of the issue of Feb. 19, 1898.

In general concentration of cinnabar ore is not deemed advisable; certainly, in many cases it would be unavailable, as it would cost more than direct treatment of ore as it comes from the mine.

ONE can only take up one timber claim under the law of 1878, or use the pre-emption or homestead right once, but one can locate as many mining claims as he can hold by annual assessment work.

TO make canvas waterproof dissolve one part of pure beeswax in two parts gasoline, paint the canvas quickly therewith. The gasoline will evaporate and leave the wax in the fibers of the canvas. This must all be done in the open air and away from a flame or light or fire of any kind.

ONE easy way to make blue-print paper is to take one gramme of citrate of iron and ammonia, and dissolve in five grammes of water. Then make another separate solution of one gramme of ferricyanide of potash in five grammes of water. Mix the two in the dark, and apply to the paper.

"YELLOW BRASS" is composed of copper sixteen parts, zinc eight parts and one-half part of lead. A light colored brass may be made of copper six parts, tin one part and one-quarter part of zinc. Red brass is composed of copper twenty parts and one part each of tin, zinc and lead.

THIS paper is always pleased to receive and publish communications of interest in mining and metallurgy. Such interchange of opinion, knowledge and experience is of common value, and mining men everywhere are invited to consider our columns an open forum for discussion and information.

THE prevailing belief among some geologists is that all placer gold has been derived from mineralized veins and other rocks forced up from the subterranean depths by volcanic action, the fine gold being gradually washed down and deposited in the lower placers. No description of any Alaskan deposits suggests a different origin.

IRON PYRITES are the bearers of gold and silver. The extensive gold deposits of the Southern States constitute a belt or accumulation of veins of iron pyrites. The gold has its seat originally in the pyrites, which, when decomposed, liberates the gold and it appears in a metallic state. The pyrites are the matrix of the gold.

THE American standard boiler horse power is: Thirty pounds of water evaporated per hour at a boiler pressure of seventy pounds, temperature of feed water 100° Fahrenheit. For example, a boiler evaporates 300 pounds of water per hour, boiler pressure seventy pounds, feed water 100° F., then the boiler's H. P. would be 10.

NATIVE SILVER nuggets are frequently found in Western mines. At Austin, Nev., such were found many years ago; also at the Silver King mine, Globe district, Arizona, and at the Mollie Gibson mine, Colorado. In Mexico the native silver found in the Batopilas mine shows as beautiful examples of its kind as ever found in any part of the world.

THE real business of the wooden aqueduct called a flume is to carry water. A sluice, however, is designed for gravel in suspension in water, and has a false bottom of riffles for the twofold purpose of preserving the real bottom from destruction by the gravel and of catching in the interstices between the riffles any gold that settles as the water and gravel pass on.

SPODUMENE is found in several places in the Black Hills, the richest mine being at the Etta tin mine near Keystone, South Dakota. Spodumene is a whitish crystal which resembles logs of petrified wood, having a similar grain. It is found in pockets and is mined by open cuts. Frequently a pocket will be struck containing several tons. It is mined for its lithia values, the material containing about 5% to 6% lithia, and considerable

silica and alumina. It is sent from New York to a refinery in New Jersey, where the lithia is saved. The ore is worth about \$40 per ton at the Atlantic seaboard.

FOR a grade to a tunnel or drift, 5 inches to 100 feet will work satisfactorily. Where cars are run by hand, the loaded car will run itself down this grade without having to be continually braked, and the unloaded car can be pushed up grade at a fast walking speed. Where animals are used and handled in trains, 3 inches to 100 feet can be operated satisfactorily.

WHERE a surface condenser is used the condensed steam may be returned to the boilers and the process of evaporation repeated indefinitely, thus securing pure water, provided the cylinder oil can be taken out of it. This would effectually dispose of the scale problem, but that advantage is often offset by the pitting of tubes and shell that results from the use of pure water.

TO MEASURE the difference of height between two places with a barometer, first measure the air pressure, P , at the lower station, and then the air pressure, p , at the upper station. Calling T the measured temperature Fahrenheit, the vertical distance in feet between the two sections = $(60,360 + [T - 32] 122.68) \log \frac{P}{p}$.

If one has a pattern made of soft pine put together with nails, an iron casting made from it will weigh sixteen pounds to every pound of the pattern. If the casting is of brass it will be eighteen pounds to every pound of the pattern. A metal that will expand in cooling is made up of nine parts lead, two parts antimony and one part bismuth. This alloy is of practical value in filling holes in castings.

ASSUREDLY, putting up buildings and machinery for work on a claim will count for assessment work if accompanied by such other work as would necessarily go with the erection of the plant, and if done in the required time. A dam and ditch built on a claim by another outside party, to convey water onto his ground, can not be counted by the owner of the location on which the dam and ditch are constructed as assessment work in securing a patent.

TO AMANGAMATE a new copper plate, many miners first rub it with extremely fine brick dust, or very finely sifted wood ashes, then rubbing it briskly with a woolen rag dipped in dilute nitric acid—one part acid, nine parts water—until thoroughly polished, then repeatedly washed in clear water. A solution of cyanide of potassium may then be applied, after which prepared quicksilver is put on until the entire surface of the plate is thoroughly coated and is bright, soft and sensitive to the touch.

A 16 AND 12x18 compressor, if in good condition, should be capable of operating three 2½" drills or two 3½" drills with eighty pounds air pressure. A 6 and 6x6 air compressor is not large enough to run any drill, as the capacity would be only about 25 cubic feet of free air per minute. This calculation is based on the three 2½" drills using 260 cubic feet of free air per minute, or two 3½" drills using 252 cubic feet of free air per minute. To calculate the free air capacity of the compressor, multiply the effective area of the air piston in square feet by the piston speed in feet per minute, which, in this case, is about 270, based on a speed of 120 revolutions per minute.

TO REMOVE accumulation of rust on iron articles, attach a piece of ordinary zinc to the articles and then let them lie in water to which a little sulphuric acid is added. They should be left immersed until the rust has entirely disappeared, the same depending on how deeply they were rusted. If there is much rust, a little sulphuric acid should be added occasionally. The essential part of the process is that the zinc must be in electrical contact with the iron. A good way is to twist an iron wire tightly around the object and connect this with the zinc, for which a remnant of a battery zinc is suitable, as it has a binding post. Besides the simplicity of this process, it has the advantage that the iron itself is not attacked in the least as long as the zinc is in good electrical contact with it. Delicate pieces of mechanism which have become badly rusted can be cleaned by wrapping a galvanized wire around them instead of the zinc, in which case the acid should not be too strong. When the rust is all cut off the articles will appear dark gray or black. They must then be thoroughly washed and oiled. It is well to warm them slightly when dry, so that the oil may the more readily sink into the surface.

AS MUCH and as careful attention should be given to the alkalinity of cyanide solutions in mill work as to the strength in KCN. Unless a sufficient, constant and regular alkalinity is maintained, the most efficient and economical results can not be had from the action of the KCN. A good average standard of protective alkalinity is one-half of 1%, as determined by a decinormal sulphuric acid solution. The best standard will have to be determined by experiment on the particular ore being treated. Some ores require as much as 1% protective alkalinity, while other ores only need to be kept positively alkaline, which alkalinity must be independent of the alkalinity due to the KCN. Zinc is soluble in alkalies and an excessive alkalinity causes an excessive consumption of zinc. This excess of zinc in the solutions is detrimental and one of the conditions which is termed "foul solutions." Lime is one of the best purifiers of water there is. A lime alkalinity in the mill solution will precipitate the organic matter in solution and much of that

which is mechanically floating, and also many of the mineral salts, thereby keeping the solutions chemically clean. About two pounds of lime is all that a ton of water will carry in solution. A greater quantity may be floated, but such excess so floated will deposit, like mud would, on the zinc, and by this coating it mechanically prevents precipitation. Such excess of lime so deposited with the precipitates would much increase their bulk and the labor and difficulty of reducing them to bullion. A good method of determining the alkalinity of the mill solutions, as practiced in the Black Hills, is given in Bulletin No. 5 of the South Dakota School of Mines.

TENSION in band saws signifies the expansion of the metal throughout the central portions of the blade, so as to stretch the outside edges and particularly the back edge. A saw when strained on the wheels must be the tightest on the cutting edge, so as not to let the saw run in or out of the cut. The speed of band saws has very little to do with the tension, although it has much to do with the work and life of the saw. Either too much or not enough speed will have similar influence in inducing cracks. Some band saw filers believe a band saw must not be open closer than 1 or 1½ inches from the edge. They claim that a saw will crack if it is opened any closer than an inch from the edge. Yet saws opened from edge to edge do not always show cracks. But if a saw is open from edge to edge the tension must be put in evenly. If a saw is wide open and the tension not even, the saw will chatter in the cut and is most likely to come off the wheels, cracked. Practical band saw men say that a band saw will not do good work without tension. The back of a saw must be looked after as well as the tension. The back of a saw should be crowned so as not to allow the cutting edge to dodge and make snaky lumber. A saw crowned about ⅜ inch in every 5 feet gives good results where the wheels are in good shape and in perfect line.

AT the Dexter plant, Tuscarora, Nev., where slimy ores are treated, the method, as described by William Magenau in this paper some time ago, is quite different from that at the Chainman. The ore is crushed with stamps and amalgamated as usual, the tallings then go to the settling tanks, equipped with Butters & Mein distributors. The settlers catch 51% of the material run into them, the overflow carrying the slimes being run into ponds and settled. As soon as one pond is full the stream is turned into another, and the former is allowed to dry for several months. The climate is so dry that in this time the upper 2 or 3 feet of the material become well baked. It is then put into cars by means of wheeled scrapers and carried to the leaching tanks to be mixed with the sands. As soon as a settler is full of sands, they are shoveled into cars and carried to the leaching tanks, where they are mixed with the dried slimes in the proportion of one car of sands to one of slimes. The mixture is leached continuously for from three to five days with a 0.2% solution of cyanide, the solution running in at the top as fast as it runs out at the bottom. Before discharging, a single water wash is given after the charge has been allowed to drain for several hours, or until no more solution runs off. The cyanide solutions go directly to the zinc boxes. The sands average \$1.57 gold and \$1.70 silver and the slimes \$3.19 gold and \$5.03 silver; the extraction is 68.8% of the gold and 37.7% of the silver.

THE electro-magnetic gold extraction process recently patented by Elmer Gates of Washington, D. C., is a "hydro-magnetic separator," by means of which the inventor proposes to separate gold from magnetic iron or magnetite. It may be but one more of those "magnetic separators" so numerous and so successful in theory—and so much of a joke to the practical miner. The object of Prof. Gates' device is to remove from the gold-bearing sand the magnetic iron which it always contains, as a preliminary to separating the gold as in the ordinary way, either by washing or by amalgamation. The apparatus consists of a copper drum, inside of which is an electro-magnet. The core of the magnet is made up of a number of iron plates with fluted edges on the pole face of one end, likewise within the drum, but which approach their fluted edges close to the inside of the copper periphery of the latter. Above is a hopper through which the sand is poured. As the gold, silica and magnetite pass through the hopper they necessarily touch the side of the drum, which is kept revolving by means of an electric motor. The drum, owing to the magnet inside of it, draws the particles of magnetic iron out of the sand which naturally adhere to its surface while the sand drops into a receptacle below the machine. The particles of iron, while magnetically held against the drum, are moved downward by it over the way lines of force of the fluted magnet face and vigorously shaken so as to detach all foreign matter. The inventor says that in practical mining work the gold would be left in with the siliceous sand, which would subsequently be put through one of the ordinary processes, with a view of separating it from the precious metal, and he argues that the magnetite once removed, the separation of the gold from the sand would become comparatively easy, claiming that from two to five times as much of the gold is derived from a given quantity of the raw material. He states that his method is simplicity itself, and further that it costs but 3 cents for each ton of sand treated. He also claims that the iron removed from the sand in the manner just described is an exceedingly valuable by-product. At an expense of 85 cents per ton he proposes to reduce it by means of the electric current into lumps, in which form it would be sent to any smelting works.

The Mechanical Engineer a Factor in Modern Mining, Milling and Smelting.*

In the early history of mining and smelting the mechanical engineer was not considered to be of very great importance. Nearly every man managing a mine had some mechanical ideas, often too many for the comfort of the man who had made mechanics his special study. It may be due to this fact that the position has not had the proper recognition and its importance fully recognized by the men who have had to do with the managing of mines and smelters.

To-day, all the professions engaged in the reduction of ore are parts of a system, and its successful operation is due to the perfection of its component parts. The geologist who studies the nature and character of the mineral vein, and its bearing on the methods to be pursued in mining, the metallurgist who defines the method of recovering the values in the ores, the chemist who determines the value and contents of the ore, and to whom we owe the development of explosives used in modern mining, the mining engineer who directs the work of the miner, tells him when and where to go, measures his work, determines the extent of the ore bodies—all, in their several spheres, are important and necessary in the building up of a great mining industry. But it is of the part the mechanical engineer has taken in the development of modern mining and smelting of which we wish to speak. The subject is comprehensive and only a brief outline of the work accomplished in Butte can be given in a short address.

There has been but little progress made in the metallurgy of copper in the past twenty years. The methods of reducing the ores are the same now as then—it has simply been an increase in the efficiency of the appliances used, the better mechanical construction of the furnaces, the improvements in transportation, the application of electricity and compressed air to the handling of materials, and the development and improvements in machinery of all descriptions used in the mining and reduction of copper ores. The handling of a large reduction works has about resolved itself into a mechanical proposition, and its successful operation depends on the precision and reliability of the mechanical appliances in use.

Starting with the mining of the ore we will speak of the appliances used by the prospector; the tools required are few: a pick and shovel, a few drills of different sizes, a case of dynamite, some caps, and perhaps a pack horse or mule. If he has found a ledge he starts to develop it by driving a tunnel or sinking a shaft; driving a tunnel is easier, ordinarily, if the ledge is favorably located; but the probabilities are that he will have to sink a shaft. When the prospector arrives at that stage two men are needed to do the work and an application of some mechanical means for hoisting is necessary. The windlass is perhaps the simplest machine in use for hoisting ore in Butte to-day. Such a method can only be used by the prospector who is searching for or developing a lead, and the value of whose time is measured by the hope that he may make a valuable strike, and, buoyed by that hope he denies himself the associations and comforts of home and society, brave the winter's storm and summer's heat, and perhaps after a life of privation ends his days in a lonely cabin. This is not an uncommon experience. Often the beginning of a large mining camp is traced directly to the prospector working with his primitive appliances.

Following the hand drill came the application of compressed air and machine drilling; although of comparatively recent origin the machine drill as made to-day is a triumph of mechanical engineering skill, and has made possible the development of our large mining interests.

Following the use of a windlass came the machine known as a whim and animal power used to operate it. If an intelligent horse is used he becomes obedient to the mine signals the same as the men who are engaged in the work. The bucket holds perhaps from 800 to 1000 pounds of ore and the hoisting is very slow, not over 80 feet per minute.

The next step in mining is the introduction of steam power and its application to the hoisting of the ore. A small geared hoist, attached to what is termed a "gallows-frame," is used, the ore being loaded in a bucket, hoisted to the surface, and emptied into bins close to the shaft.

The next improvement is to use a cage in the shaft in place of a bucket, and to take a small car down the shaft to the required station and fill it where the mining of the ore takes place; first one cage was used in a single-compartment shaft; later a two-compartment shaft was constructed and two cages used in order that the ascending load should balance in part the descending load, the engine lifting, in ordinary running, only the weight of the ore and the

rope. Then in order to increase the output of ore from each shaft double-deck cages were used with single-acting engines, powerful enough to raise the load from the bottom of the shaft. At the West Colusa mine of the Boston & Montana Co., in place of double-deck cages, single cages are used in each compartment, each holding two cars. This necessitates a shaft, each compartment of which is 5 feet wide by 9 feet long.

The Anaconda Co., in order to cheapen the hoisting of ore, substituted large skips in place of the two, three and four-deck cages. Small ore bins were constructed underground at the different levels to receive the ore from the stopes. The skips are loaded from these small bins, the gates of which are operated by compressed air. Eight to ten tons of ore are loaded into the skip and hoisted to the surface by means of powerful single-acting steam engines. Ore bins are constructed at the top of the shafts and the ore dumped automatically from the skips into these bins.

With the increase in size of engines and loads stronger gallows-frames were required. Large wooden gallows-frames were made of Oregon timber, sometimes as large as 20x24 inches and 60 to 80 feet in length. Finally it was found necessary to build them of steel and they are now made from 100 to 120 feet high. The first steel gallows-frame erected in Butte was over the West Colusa shaft in 1897; afterwards steel gallows-frames were erected at the Anaconda mines, much higher and stronger in every way.

The pumping of the water from the mines of Butte is not the least of the difficulties with which the engineer has to contend. In the early days, when the mines were silver properties, the water did not contain acid and could be used in the boilers, but as the ore changed to sulphides the water became more acid. Iron pipes, iron water-ends of pumps, and, in fact, wherever the water came in contact with iron, it was rapidly destroyed. As the mines became deeper the difficulties increased—the water was warmer, and made still more so by the exhaust steam from the pumps it was required to condense. Simple station and sinking pumps were used to pump the water from station to station until it reached the surface. Improvements were made from year to year—wood and lead-lined pipes substituted for the all-iron, larger units were installed, until now the water is lifted successfully 1200 feet by compound Corliss engines with bronze pump ends.

The transportation of ore was first done by pack horses and mules. They carried sacks of ore away from the prospect holes to the point of shipment. Later came the construction of roads, after which wagons were used. Nowhere, perhaps, are such large and heavy wagons in use for transportation of ore as those made and used in Butte. Six and eight-horse teams pull as many tons in these wagons. Later on the railroad was built close to the shafts, where ore bins were constructed, to which the ore was trammed, or dumped by the skips, and finally loaded into cars carrying from fifteen to twenty tons. The mechanical construction of the ore cars has been so perfected, steel having been substituted for wood, that they carry to-day fifty tons each, reducing the cost of transportation to about 1 cent instead of 50 cents or \$1 per ton mile, as it was originally. Now it is common to see an engine pulling a train carrying 2500 to 3000 tons of ore.

There has not been much attention given to the transportation of ore underground as yet. All the ore originally mined and most of the ore to-day is trammed by men from the stopes to the shaft station, but in the last five years horses are being used in some of the mines. It is interesting and amusing to see them strap a horse and send him down a shaft that is only 4 feet by 4 feet 6 inches in the clear. In these mines there are stables underground and the horses are seldom brought to the surface. At the large shaft of the West Colusa the horses are lowered and raised every shift, and they know as well as the men when it is time to quit, and they are always waiting to step aboard the cage and come to the surface. The large companies are constantly at work on this problem of underground transportation and no doubt some satisfactory solution of the question will be arrived at, either by the application of compressed air or electricity.

The first step in the treatment of the ore is concentration. The first copper ore that was mined in Butte was that encountered in the bottom of the shafts of the properties that had been started as silver mines. Originally the only ore that could be shipped at a profit was that carrying very high values in copper and silver. The first concentrator was built in Butte by the Montana Copper Co., afterwards the Boston & Montana Co., during the winter of 1879-80. The ore was crushed by an 8x10 Blake crusher, then passed over a shaker to a pair of 10x20-inch rolls, then to revolving trommels having 1/2-inch mesh screens, the oversize into a set of 10x16-inch rolls. This was all dry crushing and no water was used until the material went to the jigs. The fine material that was made in mining and crushing the ore was sized by a trommel having 8-millimeter, 5-millimeter, 2 1/2-millimeter and 1 1/2-millimeter screens, each size followed by a four-compartment Hartz jig. Tailings were made from each jig from the 1/2-inch down to the smallest size. Owing to their coarseness

they carried considerable values. All concentrates were shoveled from the side of the jig onto the floor and loaded into the cars to be taken to the roasters. The coarse concentrates were treated separately. Dry crushing was very detrimental to the health of the men and bad for the machinery. This was the only plant designed for dry crushing.

The principal improvements in concentrating have been made by means of coarser crushing and concentration. This was only made possible, however, by the development of blast furnace smelting. In reverberatory smelting it is necessary to crush ore much finer in order to produce high-grade concentrates that can be roasted. The tendency has been at all times to make a concentration of the ore in as large sizes as will permit a gravity separation of ore of a required mineral percentage. The Butte & Boston Co. made jigs that would handle ore passing through screens having 2 1/2-inch openings. After the coarse concentrates are taken out the work of crushing and grinding the ore, or "middlings," as it is termed, is carried on step by step until now no tailings are made that will not pass through a 1 to 1 1/2-millimeter screen. Various types of machinery for fine crushing have been designed. Chili mills of different forms have been tried, but so far Huntington mills are used in preference to the other types. Small (3 1/2-foot) ones were first used for fine grinding in Butte in the lower works of the Boston & Montana Co. in the summer of 1884. Five-foot mills were tried at the Butte & Boston concentrator in 1887, but the first ones made were too light. Their mechanical construction has been continually improved and their capacity increased. At the new works of the Washoe Co. 6 foot mills are used that were designed in the engineering department of the company.

With this fine crushing it was found necessary to adopt machinery for the further separation of the values from the slimes made in mining and concentrating the ore. Poorer slimes were continually being made as material was crushed finer. Tables of the Evans type were used in order to make this separation. About the same time Frue vanners and Rittinger tables were introduced. The latest development in the treatment of slimes is the use of shaking tables of different types, such as the Wilfley, Overstrom and Cammett. These are a development of the old Rittinger table, which was used in early Butte practice. The capacity of the machinery used in the reduction of the ore has been constantly increased until now each section of a concentrator will treat 800 tons of ore, compared to 25 or 100 tons, as in the first mills.

Steam stamps were used by the Anaconda Co. and the Butte Reduction Works, this being an adaptation of the Lake Superior practice to the reduction of ores. The great difficulty with stamping has been the fact that it made too large a proportion of slimes. This was early recognized by the different concentrator men.

In 1890 and 1891 the Boston & Montana Co. built their concentrator at Great Falls. At that time there was a question as to whether they would use stamps or rolls and crushers. One section of the mill was fitted up with the stamp and all necessary machinery for treating the ore; two other sections were fitted with rolls and crushers. Although at that time the mill was designed with reference to adopting steam stamps, later experiments showed that the crushers and rolls were better and the stamp was taken out.

The Anaconda Co. started to build their upper works in 1883 and 1884, using at first crushers and rolls; later substituting steam stamps. The repairs on the stamps are less as a whole than on the crushers and rolls, but the losses are greater, owing to the quantity of slimes produced. In the designing of the Washoe concentrator it was determined to use crushers and rolls entirely.

The next step in the reduction of the ore is the calcination, or roasting, of the fine concentrates. The first furnaces used for this work were reverberatory calciners, in which the charge had to be moved by hand from one end of the furnace to the other. This was a slow and laborious process, besides being very expensive. Owing to the high price of labor and the low capacity of the furnaces, which was only about ten tons in twenty-four hours, it was soon found necessary to adopt some mechanical means of stirring the ore. Quite a number of different furnaces were designed and patented for mechanical roasting. Some of the best known in the Butte district, of the open-hearth type, are the Pearce furnace, now in use at the Colorado Smelter; the Brown-Allen-O'Hara, in use at the Butte & Boston; the Keller-Cole and Gaylord at the Parrot, and the four-hearth Holthoff-Wetthey furnaces, in use at the Butte Reduction Works. Nearly every master mechanic and superintendent who was in charge of work at the different plants had a patent calciner. At Anaconda the original calcining plant consisted of twenty-eight reverberatory furnaces. In 1888, or about that date, two small Brueckner furnaces were installed in the upper works. These Brueckners gave such satisfaction to the company at the time that in the building of the lower works it was determined to install a complete Brueckner calcining plant, which was the largest of this kind in the world. It consisted of ninety-six Brueckner furnaces, 10 feet diameter and 20 feet long, their capacity being from twelve to fifteen tons

* A paper read by C. H. REPATH, consulting engineer new reduction works, Anaconda, Mont., at the Butte, Mont., session of the Mining Congress, Sept. 3, 1902. Specially reported for the MINING AND SCIENTIFIC PRESS. See illustrations on front page.

per day. Later on, the upper works were remodeled and forty more were installed.

Early in the history of the calcination of the Butte ores the opinion was advanced that a calciner would be designed some day in which the heat necessary for the desulphurization of the ore would be obtained from the ore itself. This was first accomplished by the introduction of the Herreshoff furnace in the Montana Ore Purchasing Co.'s plant in Butte, about the year 1896. Small calciners, about 10 feet in diameter, having five hearths, were built and successfully operated. This was quite a step in mechanical roasting; still the capacity of the furnaces was small. Shortly after the introduction of the Herreshoff furnaces in this plant, the question was taken up by the Boston & Montana Co., at Great Falls, of designing a furnace that would have greater capacity and less repairs than the Herreshoff. A roaster was built on the same lines, 16 feet in diameter, and called the McDougall, having an air-cooled shaft and solid cast iron arms; this furnace had eight hearths. It was tried, but was not very successful, on account of the long arms and rakes. The heat developed was too intense for the cast iron arms, and they bent down under their own weight. It was then found necessary to cool them, and a design was made to use air; this was not satisfactory, and later a water-cooled shaft was substituted and the number of hearths reduced to six. This proved very successful, and, with the development of the mechanical details, the McDougall furnace stands to-day pre-eminent as an automatic calciner as far as repairs and cheapness of operation are concerned.

In early times it was necessary to calcine the ores for use in blast furnaces; this was done by means of "heap roasting." It was due to the gases produced by these heaps that the smoke of Butte became notorious. The blast furnace practice of to-day was not known at that time. To desulphurize the rich ores, large heaps—practically dumps of ore—were built over a layer of wood about 2 feet deep and fire started. This heat was sufficient to ignite the sulphur in the ore; by and by the whole mass became heated and the sulphur was driven off. It would take a month or more to roast a heap, depending upon its size. A slight improvement was made in the method of taking care of the smoke by the construction of stall roasters. The stalls were about 8 feet long and 6 feet wide, arranged in two rows with flue between, this flue being connected to a stack. This is still a good method where blast furnaces are used and there is no converting plant.

The first smelting done in Butte was in reverberatory furnaces at the Colorado Smelter, about 1880, when Mr. Williams built two furnaces having hearths about 9 feet wide and 14 feet long, using cordwood for fuel. These furnaces were charged by hand, the roasted ore being wet down and then shoveled into them from the side doors. If they smelted from twelve to fifteen tons in twenty-four hours they were considered to be doing good work. At the old upper works at Anaconda the first furnaces built were 10 feet wide and 16 feet long. They were also fired with wood and charged by hand. Each furnace had an individual stack. It was soon found necessary to increase the size, and so they enlarged step by step until in 1889 they were something like 12 feet wide by 18 feet long and the capacity had been increased to thirty or forty tons per day. The dimensions of the furnaces were further increased in width and length and this necessitated different means of charging, so hoppers with bottom gates were placed above them into which the charge was dumped; corresponding holes were made in the roofs of the furnaces; these were covered with brick slabs. The tramping of the ore to the boppers was done by hand and with small cars, and it is the method in use at most of the plants to-day.

In 1899 the Colorado Co. built a furnace that was 20 feet wide and 50 feet long; the Butte & Boston Co. built one like it at the same time. These furnaces have been quite successful and are the size adopted at the new works of the Washoe Co. One of the late improvements made in the mechanical construction of furnaces is the substitution of heavier binding irons and 12-inch brick in the roofs in place of the 9-inch formerly used. These furnaces have a capacity of 100 to 150 tons in twenty-four hours, as compared with the original 12-ton furnaces.

In 1890 and 1892 the Boston & Montana Co., at Great Falls, introduced gas fuel for the smelting of ores. Eight open-hearth, steel-tilting furnaces and a number of Welman gas producers, for the making of gas from Sand Coulee coal, were installed. The furnace at that time was 17 feet long and 13 feet wide in the hearth. It was necessary to use gas for the smelting of the ore, as the coal that could be obtained in that district was too low in quality to permit of direct smelting by means of the standard reverberatory furnaces. In 1895 they built a stationary gas furnace 30 feet long and about 12 feet wide. This did more work than the small ones, and, later, the size of the furnaces was increased, until now they are 43 feet long and 16 feet wide, the capacity being increased from 40 to 150 tons in twenty-four hours. During this time mechanical improvements were being made both in furnaces and gas producers. After the installation of the Welman, a number of Taylor producers were installed; but both types were superseded by a mechanically stirred producer, designed

and developed by the engineers of the company.

In disposing of the slag the first practice was to skim it from the furnaces into sand beds, the same as pig iron was originally cast; the slag was then loaded into barrows and wheeled out to the dump. The building of larger furnaces necessitated quicker methods of disposing of the slag than wheeling it, and in the year 1888 the Anaconda Co. introduced in their lower works the granulating method. The slags were skimmed from the furnaces into launders, from which they dropped into a steam of water that carried them away; this was a great step in the disposal of slags, but it is only possible at plants situated like those at Great Falls and Anaconda, where there is ample water supply. In the Butte plants other methods are used.

As the slag dumps increased in extent and the wheeling of slag became more expensive, large slag-pot cars were designed that would hold from five to eight tons, using horses for pulling them to the dump, where they were emptied by means of hand gearing. The application of electricity to this work was introduced at the Butte Reduction Works, followed by the Montana Ore Purchasing Co., Parrott Co. and Colorado Smelting Co. The Butte & Boston Co. were still moving their large slag cars with horses until the year 1899, when they adopted electric motors.

The matte from all the old plants is cast direct from the furnace into molds sufficient in number to take the full charge. In early days a furnaceman thought four tons of matte was a good tap, but now they often tap forty to fifty tons at one time; this may represent the metal of one or more days' smelting. The Boston & Montana Co., at Great Falls, introduced the practice of taking the matte direct from the reverberatories to the converters; in this case only five to ten tons are tapped at a time. At the new works of the Washoe Co. the matte is tapped into large fifteen-ton ladle cars, and then taken in a molten condition directly to the converter plant and charged into the converters, or storage furnaces.

Not the least interesting development in the progress of modern copper smelting is the utilization of the waste gas from the reverberatory furnaces for generating steam. This has been common practice in iron blast furnace smelting, but was not applied to reverberatory furnaces, smelting sulphide ores, until within the past two years. The results were very gratifying, so much so that arrangements are being made to build a boiler in connection with each furnace at the Washoe works. The time is not far distant when all the boiler power required to run a whole smelting plant will be generated by the waste gases from the furnaces, utilizing the heat from the sulphur as well as the gases from the coal used in smelting the ore.

The first blast-furnace smelting that was done in Butte was near the site of the Parrott mine, and was said to be in an experimental brick furnace, using a blacksmith's bellows for blower. In 1880 the Montana Copper Co., in their upper works, started their first blast furnace. This furnace was made in Denver, and was said to have cast iron water jackets. Connections to the tuyeres were made in heavy canvas tubing. Air was furnished by a small Baker blower.

The first steel water-jacketed furnaces were built for the same company, and were about 36 inches by 84 inches, with six tuyeres on each side. The ore and flux was dumped into small open bins near the furnace. The charge was made up by the furnaceman shoveling the required quantities into a barrow that stood on a charging scale. This was dumped at the door of the blast furnace, where it was shoveled into it with the necessary fuel, said to be charcoal. The capacity of the furnace was only about twenty-five tons per day, and matte and slag were alternately tapped from the crucible of the furnace; this crucible was deep and provided with separate matte and slag tap holes. The matte was tapped into pots, and then taken to the casting floor and cast into molds. Afterwards the deep crucible was discarded and a forehearth was substituted, and a continuous flow maintained from the furnace into the forehearth, or settler. These were made movable, so that when they chilled solid they could be taken away and new ones substituted.

In the year 1894 a new blast furnace, 36 inches by 120 inches, was built for the Boston & Montana Co. at Great Falls. At that time it was determined to try a larger settler—one that would hold sufficient matte to charge a converter; this settler was about 10 feet in diameter and 10 feet high. It was thought at first that the matte would chill so that it could not be tapped, but this difficulty, with others, was overcome, until settlers as large as 16 feet in diameter and 10 feet high were constructed, having large settling capacity for separating the slag and matte, at the same time holding sufficient matte to charge one or more converters. In 1896 plans were made for a large blast furnace, 42 inches wide and 180 inches long, and about 30 feet from charging to tapping floor. This presented a good many problems in mechanical construction, necessitating a double set of water jackets, each 10 feet in height and 7 feet 6 inches in length, with all necessary piping, tuyeres, etc. Flexible water connections of rubber hose were made instead of rigid piping to take up the expansion of the furnace. This furnace, on account of metallurgical difficulties, was not a decided success, and

another was built, 24 feet from charging floor to tapping floor, the upper and lower jackets being made 3 feet less in height. Various experiments were made to determine a satisfactory width and inside taper, and finally one that was 54 inches wide and 180 inches long was adopted as standard. Such deep furnaces necessitated higher blast pressures; instead of 16 to 20 ounces, as in the old furnaces, pressures of 30 and 40 ounces were used. This required blowers of larger capacity and greater strength.

With the construction of large furnaces the capacity was so increased that the ordinary methods of charging with wheelbarrows and shovels was found to be too slow and inadequate, and so cars and narrow-gauge trucks were installed. Charging scales were placed in the tracks in front of the storage bins, and the material weighed as loaded on the cars. These cars were designed so that the body of the car could enter the furnace, dropping the charge without shoveling. A train of these cars is hauled from the storage bins to the furnaces by an electric motor. The charging doors of these furnaces were so large and heavy that it was found necessary to move them by power; at the Washoe works the doors are lifted by air, while at Great Falls hydraulic power is used. At the Washoe Co.'s works standard-gauge tracks are used, which necessitated a new design of car and method of charging. The capacity of these furnaces is about fifteen times that of the small one first used. Some years ago, at the Butte & Boston, a method similar to those in use at the iron blast furnaces was tried. The charge was dumped into a hopper with a bell in the bottom, located above the furnace; at the proper time the charge was dropped into the furnace. This did not work satisfactorily and was discarded.

There has never been devised a satisfactory method of treating fine material on account of the quantity of flue dust made in roasting and smelting. Large dust chambers and flues have been built to catch the dust, but still with the draft required in the furnace a large amount of it is carried out into the atmosphere. Even the flue dust that is caught in the flue chamber is hard to smelt in reverberatory furnaces. In later years some attention has been paid to pressing this material into brick form, using lime as a bonding material.

Two types of machines are used in the work and the working of the material is made as automatic as possible on account of its low values. The briquettes at first were allowed to dry in the air, but this was too slow. At the Washoe works mechanical methods of handling as well as drying them are used. The briquettes after they are dried are hard and compact enough to smelt in a blast furnace. This is probably the most complete plant for briquetting flue dust and slimes at any copper plant in the world.

In 1880 Pierre Manhes made a successful application of the Bessemer process to the treatment of copper matte. In the fall of 1884 the Parrott Company erected the first converting plant in Butte. They were stationary converters and had to be lined in place. They were tilted by hand power by means of worm-wheel gearing. Later they used belting and power transmitted from a line shaft. These converters ran from 1884 to 1890, when they remodeled the plant and substituted interchangeable converters operated by hydraulic power instead of belt transmission. Instead of lining converters in place a car with an adjustable top was used for transferring the converters to and from the stalls and for placing it in exact position for the air connections; these cars were run into the lining shed and the converters were transferred by jib cranes to the lining platform where they were relined. The material for lining was first crushed by crushers and rolls and then mixed and tamped into the converters by hand. Matte for the converters was furnished by an independent cupola set in front of three stands. From this cupola a swinging spout carried the matte to the converter. At first it was believed that only a high grade matte of about 70% could be reduced.

In 1888 the Anaconda Company built two small experimental stationary converters and set them on four-wheel trucks. These trucks were moved in and out of the stalls on tracks. They were tilted by hand and in much the same manner as large slag or matte ladles are tilted to-day. They were about 4 feet diameter and 7 feet high. In lining, it was necessary for the man to enter the converter head first to finish the claying, which was exceedingly uncomfortable and inconvenient.

In 1890 Otto Stallman, who was at that time the superintendent, designed a stationary converter of a slightly different shape to that used by the Parrott Company. Twelve of these were installed in the upper works and were run for about four years. In 1892 they built their present old works converter plant, using the Parrott type, making it 6 feet diameter and 10 feet high.

In 1892 the Boston & Montana Company in building their converter plant adopted practically a steel converter that was 7 feet diameter and 13 feet high, and was the largest in use at that time. Later, in the erection of the Butte & Boston converter plant, a converter known as the "barrel" type was adopted. With this less blast pressure is required than in the upright converters.

At the Washoe Company's works, designs were

made in the engineering department for a still larger converter of the harrel type, 8 feet in diameter and 12 feet, 6 inches long, weighing when charged about sixty tons. The matte is tapped directly from the reverberatory and blast furnaces into fifteen-ton ladle cars and taken to the converter plant by compressed air locomotives. The matte is poured into a hopper from which launders carry it to the converters.

Air hammers were first used in 1895 for lining converters at the Boston & Montana plant at Great Falls, using fifteen pounds air pressure. This reduced the cost of the linings and increased the efficiency of the converters. The same machine was adopted by the Anaconda Company. The harrel converter does not permit of the use of this machine, so the Butte & Boston use a small air hammer, suspended from an overhead crane, the same as is done in foundry practice. At the works of the Washoe Company the Ingersoll-Sergeant drilling machine, suspended from a crane, has been adapted to tamping the converters.

The methods of handling the slag from the converters vary in the different plants. At the old works of the Anaconda company the slag was poured into small pots and then taken to the platform to cool, where it was hoisted by a platform elevator to the charging floor of the blast furnace and charged directly. At the Great Falls plant the usual practice has been to pour the slag from the converter into a ladle, then into sand beds, where it stays until cooled sufficiently to break easily. These slag blocks are broken into large pieces by an ordinary drop weight handled by a crane. If the slag thus broken is too coarse for use in the blast furnace, it is further broken by the men with hammers and then taken to the blast furnaces. At the Butte & Boston and other plants the greater quantity of molten slag is poured directly into reverberatory furnaces, only the skulls being broken up and taken to the blast furnaces. The amount of this material required as a flux in the blast furnaces determines the amount poured into the reverberatory furnaces. The conditions existing at the different plants govern the practice of disposing of slag. At the works of the Washoe Company slag is poured into large ladles and then taken by the crane to a pouring stand where it is poured into a steel pan conveyor. In passing out and up to the storage bins the slag is cooled by water and dumped automatically into the bins.

The copper in some of the plants is poured from the converters into molds on cars, either into pigs or hars weighing 200 to 250 pounds, and shipped in this form to eastern refineries. At Great Falls part of it is cast into anodes for the electrolytic refinery. The copper at this stage is about 98% to 99%, but still carries the gold and silver contents of the ore besides other impurities. The greater percentage of these impurities in the converter copper is taken out by re-melting the metal in a reverberatory furnace and then casting into anodes for the electrolytic refineries, or into casting copper if the gold and silver values are low. The anodes made in this manner are preferable to those cast from the converters, as they contain less impurities to be disposed of in the electrolytic plant.

In 1897 the Anaconda Company constructed a tilting furnace out of an old Brueckner roaster, and the copper was poured from the converters into a ladle and then into a furnace in a molten condition. The copper from this furnace was cast into anode molds set on two-wheel trucks. When loaded they were wheeled out to the railroad cars and dumped, and the anodes shipped to the electrolytic refinery. Later on three more tilting furnaces of improved type were installed and were very successful.

At the Washoe Works stationary refining furnaces capable of holding from 120,000 to 150,000 pounds of copper were installed. A casting machine is placed in front of each furnace. The copper runs from the furnace into a small tilting ladle and is poured into the molds on the machine. Hydraulic power moves both ladle and casting machine. The molds and copper are cooled by a spray and then are pinched out of the molds by men standing at the end of the machine. The copper then goes into a hosh in which there is a conveyor partly submerged in water, where it is further cooled, and is then brought out and dumped onto the floor, when it is weighed and loaded for shipment.

The last process in the refining of copper is the electrolytic, in which the gold and silver and the remaining impurities are separated. The method is electrical and chemical, and yet mechanical appliances enter largely into the work. The principal improvements of later years have been greater economy in the production of power by the use of larger generators, direct connected to water wheels or engines. The problem is to produce cheap electrical energy in enormous quantities.

In the early days the only power required in treating the ore and making matte was in concentrating and blast furnace smelting, but principally in concentrating. Steam was carried in the boilers at 60 to 80 pounds and a 100 H. P. engine would do all the work. Now steam and electric power is applied in every department. Concentrating requires more power. Mechanical roasters require it, reverberatory smelting requires it for furnace draft, blast furnace smelting needs more, and converting takes enormous quantities for compressing the air re-

quired. But while we use vastly more power, yet we produce it for less money, because we use steam carried at 175 and 200 pounds pressure, and use it in triple expansion 1000 and 2000 H. P. engines, in direct connected 375 H. P. compound engines and blowers, and in triple expansion blowing engines, all running condensing. The Washoe plant with its 10,000 H. P. equipment has not a pound of steam going into the atmosphere, but all the heat that can be is used in accomplishing work.

I have tried to show that the great progress and development in mining and smelting in the past twenty years is due principally to the perfection of the mechanical appliances and their adaptation to the problems that enter into the production of copper, and also that the mechanical engineer has won a name and place for himself second to none in importance in the field of modern copper mining and smelting.

Application of Geology to Mining.*

There was formerly a wide gap between the scientific geologist and the practical mining man. Neither understood enough of the other's work. The geologist, secure in his knowledge of some scientific principles, was amused at the many blunders and crude theories of the prospector and miner; and the miner, keenly alive to the pedantry of the college professor and his frequently obvious ignorance of things as they really were in nature, was inclined to scorn the man of science.

It is not to be denied that this lack of human sympathy was chiefly the fault of the geologist. Geology is a new science, and mining geology, as we now understand it, is very young; and let us say thirty, forty or fifty years ago there was not nearly so much known on the subject as now. Yet many of the scientists of that day may have been tempted by vanity or money to go beyond their scope and to make confident predictions and conclusions in regard to ore bodies; and these predictions were often on entirely insufficient grounds, as was in many cases soon proved by actual mining. This genus of so-called mining experts is yet alive and even relatively numerous, but they are coming to be recognized as having the same standing in their profession as the quack traveling doctor does in the medical world. One may have sad experiences with fake doctors, yet he will not scorn the services of the competent specialist; and so it is now in mining geology.

The present close and ever-progressing amalgamation of geology and mining into mining geology is due to the simultaneous progress of both. The perfection of the principles of mining have been brought about by diligent research into every branch of the subject. Happy-go-lucky methods are falling into disfavor, and everything is being brought as far as possible to a scientific basis. So the intelligent miner has come to realize that the geology of his mines is a complicated and valuable science, the advantages of which are grasped only by the most persistent study.

At the same time, geologists have been making rapid progress during the last few decades toward a complete understanding of those departments of geology especially connected with ore deposits. The old-time geologist was paleontologist, petrologist, stratigrapher and philosopher, and was ready to consider himself a mining geologist during his leisure moments. The modern geologist, with the necessary previous training in the other branches of geology, devotes his chief energies to his chosen work and succeeds in becoming practical as well as theoretical, just as the modern miner has succeeded in becoming scientific as well as practical.

This development, though strongly marked in Europe, has nowhere had a more rapid growth than in the United States. The refinement of mining methods which has put the American miner in the foremost rank, has led to his calling for help to solve the knotty geological problems of the mines. First, it has been the U. S. Geological Survey which has responded to the call and has sent its men to help the miners in their study, and to receive as their recompense a more profound acquaintance with their own specialty. This work has been greatly increased of late years and is constantly being enlarged. The names of Hague, Emmons, Becker, Ransome and many others are familiar to the mining world.

The successful mining geologist must have a thorough acquaintance with the principles of geology, and at the same time understand the general principles of mining; and he must be able to judge nicely where the two come together. Every miner is by force of necessity a geologist, for no matter what his work, he is constantly obliged to confront geological problems; but as his knowledge and training are apt to be too slight, his deductions and theories are apt to be wrong. There is no bolder theorist than many a practical miner. I remember having had told me by a prominent western mining man, now dead, that a certain fault was no fault because it had slickensides along it. He said he never knew slickensides to occur along a fault. Now, wrong geological principles, crudely deduced or only imagined, are among

the most dangerous things to successful mining, but carefully reasoned out by a trained and experienced mind, they are essential to proper exploitation.

One does not ordinarily realize how often the most unlikely principles of geology have highly important economic applications. A general knowledge of the nature and origin of sedimentary and igneous rocks, of the process of erosion and deposition, of movements within the earth's crust (producing folding, faulting and mountain making), of the chemical processes carried on by waters and vapors at the surface and underground—even the study of land forms and in what ways they were produced—these may all have their bearing.

It is important to understand the fact that in a series of different rocks ore may come to be deposited in certain beds in preference to others, and one must understand the reason for it. The bed in question may be porous, like a sandstone, and therefore afford a channel for circulating metal-bearing waters and provide open spaces for the deposition of minerals from them. Or the stratum may be especially impermeable to water, so that mineralizing solutions, either ascending or descending, cannot find a passage, but spread out above or below and there deposit what they carry. Such is the case with some compact shale beds. Or a stratum may be otherwise especially fitted for the deposition of minerals, as a bed of limestone, which in certain cases is very susceptible to replacement, and so would be chosen in preference to more refractory rocks. Or a stratum may have some other chemical peculiarity which will precipitate the contained metals from traversing waters. For example, a bed containing organic matter will often reduce ore deposition; a bed rich in iron may precipitate gold from solutions.

It is important to be able to distinguish between a bedded ore deposit, contemporaneous with the sedimentary rocks in which it occurs, and one of subsequent introduction. In the first case the ore will invariably follow its regular horizon, while in the second we must be always expecting it to deviate or occur in other forms. The latter caution must be maintained in regard to those original bedded deposits which have undergone secondary concentration by circulating waters. Such waters, besides concentrating the ore within the parent bed, are likely to carry it out and form ores at a greater or less distance away from it.

Where ores occur in bed form it is important for the miner to be able to trace and recognize the same bed in different places. Ore-bearing strata sometimes extend as such for long distances, as is the case, for example, with the iron-bearing stratum of the Mesaba range, in Minnesota, or it may be of limited extent, the ore disappearing with some change in the physical or chemical conditions. The relation of an ore-bearing bed to other beds lying above and below should be studied. Often, where the important stratum is not exposed at the surface or concealed by debris, the recognition of a bed having a known relation to the ore bed leads to the discovery of the latter and its contained ore deposits.

Some knowledge of fossils is often of value for the recognition and tracing of a stream containing valuable minerals, especially in separated districts. This is so because beds having the same physical appearance may and do occur in many ages, while perhaps only in one were the finer conditions for producing deposits of valuable minerals fulfilled.

Passing to the study of igneous rocks as applied to ore deposits, we find a field of some importance. In fact, it is even true that miners have always been disposed to give to different varieties of igneous rocks a significance as regards ore deposits which they have hardly deserved. The proper identification of such rocks is a puzzle to the miner. It is necessary to be able to distinguish an igneous from a sedimentary rock, and this can in most cases be easily done. But the finer distinctions are generally of slighter importance. Formerly, the knowledge of igneous rock was much less than now. To take a single example: Baron Riechthofen described propylite many years ago as one of the principal volcanic rocks at the Comstock lode. On account of the association of this rock with the wonderful mineral riches of the Comstock lode, it became a favorite with miners, who called everything propylite that they possibly could. Since then the investigations of Becker of the U. S. Geological Survey and others have shown that the rock is simply an altered andesite.

All this may appear to be really on the subject of what a knowledge of igneous rocks can not do. But you must remember that it takes a profound knowledge of those rocks to know what they do not stand for as well as to know what they do stand for.

A general knowledge of the broader rock divisions, such as the granitic, dioritic, diabasic and peridotitic rocks, is necessary to the finished mining man. It is proper to know the general distinction between the rhyolitic, andesitic and basaltic rocks. Terms like porphyry, syenite, trachyte, phonolite, amygdaloid, dolomite, felsite, greenstone and serpentine are used daily by the miner, and he should know exactly what he means when he uses them. He should know that igneous rocks occur either in fundamental great bodies or are intrusive or are poured out on the surface as lavas.

It has long been a matter of observation that there

* A paper read by J. E. SPURR at the Butte, Mont., session of the Mining Congress, Sept. 3, 1902. Special y reported for the MINING AND SCIENTIFIC PRESS.

is the very closest connection between most igneous rocks and ore bodies. Probably nine out of ten ore deposits have some visible connection with a body of igneous rock. In general, also, a country free from igneous rocks has a scarcity of ores. There are reasons for this relation.

Of the different forms of igneous rocks, intrusive rocks are perhaps the most favorable for bringing about ore depositions. A study of the conditions of ore depositions with igneous rocks will show that ore bodies should be chiefly expected along or near the contacts, especially those of intrusive rocks; after these the past or present channels of water circulation should be investigated.

There are some metals that show a preference for igneous rocks. This is a point upon which we are continually gaining new information. Chromium ore deposits are hardly found, save in very basic dark rocks, such as peridotites. Platinum is chiefly found in place in similar very basic rocks. Tin, on the other hand, is always found in or in connection with granite. I believe that gold in the form of gold quartz shows a decided preference for siliceous rocks, especially granites.

Let us turn to the study of dynamic and structural geology—the consideration of the forces which produce changes and movements in the earth's crust. One of the most important forms of movement is the bending and breaking of rocks, particularly noticeable in strata. The study of the arrangement and structure of these bent and broken rocks is very important in mining problems.

For example, if a certain bed is ore-bearing, it is of great use to be able to trace it after it has been folded and faulted. Any ore body may be more or less completely faulted, and the recovery of the ore body beyond the fault plane is one of the chief puzzles of the miner in many districts. But this is not always an easy thing to do, as many can testify. We cannot look into the earth and see all the folds and faults. We have only certain rock outcrops at the surface, certain data in the mines, and from these we must construct the whole as near as we can. For mining purposes, measurements and calculations must be as accurate as possible.

In these Western States it has seemed to the writer that in some districts at least nine out of ten shafts and tunnels have had no result, and probably eight out of the nine would not have been begun had the promoters some idea of the geological structure and the nature of the ore deposits in each particular district. A rich mine is struck somewhere; the surrounding land is taken up; the district is boomed; capital pours in and before you know it the country is full of holes. Then the boom subsides, the holes are abandoned; the few intelligent or lucky men open their mines and the district settles down to the humdrum of a steady producer; but in many places it appears to the observer an open question as to whether more money has been sunk in the ground or taken out of it.

Some geometrical conceptions must be cultivated in this department of mining geology. Take, for example, the comprehension of the attitude of a vein or bed as judged from its surface outcrops. The uneven surface cuts beds, dikes, faults or veins at all angles, and the intersections, which constitute the outcrop, are infinitely varied. A bed or fault having a straight strike may have an outcrop which will describe all kinds of curves as represented on the geologic map. On cross-sections, faults are generally represented as cuts in a vertical vein plane; but the real displacement may be in any direction, and sections to show this must be made in a plane which includes the line of movement. So firm is the old incorrect idea of a fault being a vertical movement in the stratified rocks that I have heard people doubt whether a differential movement along a bedding plane was a fault at all. The absurdity of this idea is apparent. Suppose that the bedding fault cut and separated an ore body, would the mining engineer have any doubts about its being a fault then?

It is economically important also to determine the relative ages of faulting and ore depositions in each case. Complicated instances may happen. To take a not too difficult example a period of faulting may occur, followed by ore deposition which may be partly along the faults; then a second of faulting may displace the ore bodies and also the earlier faults.

If an ore deposit has been formed before folding and faulting, then the displacement of the rocks affect to the same extent the ore bodies, and the continuation of ores interrupted by a fault can be confidently predicted at the same horizon at the other side. If the opposite is true, then no such calculation can be made. The ore bodies will be unbroken, and although they may be interrupted along the fault lines, for reasons connected with their depositions, yet their continuance on the other side can not be assumed.

A specially complicated and very likely case is where faulting and folding go on for a long time slowly and contemporaneously, with a continual slow process of ore deposition. The first ore deposits may be subsequent to the first faults and folds, but they will be disturbed by the latter movements; yet these latter faults may be chosen as the focus for newer ore deposits. These may be broken by still more recent movements. In such cases, only careful examination can direct exploitation most economically.

Where two water courses intersect, he these courses two faults, two joints, the intersection of a joint or fault, a joint or fault with a porous stratum or anything else, there the ore is likely to be most freely deposited. This is the explanation of most ore shoots or chimneys.

The application of geology to placer mining is also varied. In 1896 I was in the Yukon country where the rivers have cut down through an old plateau, leaving at various heights terraces which are portions of former valleys. I reasoned that since the present beds of these streams contain gold-bearing gravels the terraces must also be auriferous. In my report, published by the United States Geological Survey, I advised miners to prospect these high terraces, and since then many profitable bench diggings have been found.

In conclusion, I may be allowed to repeat that often the combination of the most abstract geological principles may lead directly to results of the most practical kind, with a direct bearing upon mining.

First Aid to the Injured in Mining Accidents.*

The causes of mining accidents are too numerous and varied to permit of a distinct classification. Those most constantly operative are falls from roof and sides, use of explosives, foul gases, operation of hoisting and traction machinery, explosion of inflammable gases (coal mines), traversing ladder ways, placing of timbers. Under the term miscellaneous may be grouped all others which contribute in any degree to the production of accidents. While many accidents from the nature of things are unforeseen and unavoidable, it is to be regretted that a certain percentage far too great is due to either carelessness or disobedience of the rules established for the protection of all, including those who habitually transgress them. It seems almost incredible that men should persist in dangerous and forbidden practices which imperil the lives of others as well as their own merely to save time or avoid a little additional work, yet this is often done with no apparent concern as to what may happen in consequence. This indifference to danger is perhaps not intentional; constant exposure without injury begets a disposition to underrate the liability to accident and the necessity of guarding against them. This fact, however, does not excuse one who commits a rash act or who by negligence sacrifices the lives of his fellow-workman instead of contributing his share to their preservation by more careful attention to duty. The most reliable guarantee of safety must be based upon the practical knowledge possessed by the miner himself. He is expected to understand the nature of the ground in which he works, the proper manner of breaking it, the support required during and after the extraction of the ore, the precautions to be taken for the safe handling of explosives, in short the whole procedure is in his hands and the safety and efficiency of the work depends upon the skill and judgment exercised in its accomplishment. Self-protection is a matter of individual responsibility in so far as the immediate surroundings are concerned and should be the first consideration in all that is undertaken. The conditions which pertain in mining differ materially from those that exist in ordinary labor above the surface of the ground. The miner, for instance, must work by the aid of a candle or safety lamp, and such light may prove inadequate for the close inspection of loose rock in the roof and sides of levels and stopes, and unless special care is taken dangerous indications may be overlooked even by a careful and competent observer.

These are some of the common and ever recurring situations under which the work is done. Something more than the mere ability to perform manual labor is demanded; there must be skill to direct and govern every act; mistakes are perilous by the swift and destructive consequences which may follow. To become skilled as a miner an apprenticeship more exacting than that practiced for the various trades must be accepted as the true method of training.

Looking a little further into the causes of mining accidents we find an appreciable number chargeable to the use of explosives. The agent most generally employed is nitro-glycerine, known to the trade as dynamite or giant powder. This substance is reasonably safe at a moderate temperature and under ordinary atmospheric conditions, but is always to be regarded with suspicion and few liberties taken with it, as no one can as yet determine the exact explosive point at any time or place, much less the influences which lead up to it and induce a state of extreme sensitiveness which responds to the slightest jar or vibration. It possesses the disadvantage of readily congealing at a lowered temperature, necessitating the application of heat to expel the frost before using. This latter process is a source of real danger and ought not to be trusted to inexperienced hands or to any one for that matter without the proper appliances for regulating the heat to safe limits. The method which gives the best security is that by which a mod-

erate and uniform temperature is maintained, the placing of a competent man in charge of the process whose duty it is to supply the miners with powder and fuse upon requisition. Accidents which occur while charging the holes or from mistakes in length of fuse, neglect in signaling, defect in arranging facilities for retiring to a safe distance, are for the most part preventable and the fault lies with the workmen themselves.

The equipment of shafts operated by means of cages has been so well perfected that comparatively few accidents are noted if we take into account the amount of work done and the number of men transported to and from their work from month to year in the various mines that are in active operation. When an accident does occur in connection with the working of a shaft it is usually a serious one. The parting of a cable, the sudden giving of the brake upon the hoisting engine, a failure of safety clutches, overwinding and precipitation of the cage to the bottom of a deep mine—any one of these unfortunate mischances must necessarily be attended with loss of life.

In sinking winzes and working shafts in the less pretentious mines, buckets are used to convey men and for general use in hoisting. The bucket when working without guys is not under absolute control, and when propelled at a high rate of speed assumes a rotary motion, which is apt to cause vertigo in some individuals to such a degree as to render them incapable of retaining their grasp upon the cable, as in one instance coming to the writer's notice, that of a miner falling from a bucket in making a descent of 200 feet in a vertical shaft. No other cause could be assigned. Closing the eyes tightly will in a measure counteract the sensation of vertigo and prevent accident.

The speed should, however, be regulated within reasonable limits. The practice of riding upon a loaded bucket is unsafe and should never be done. Here is a case in point: Two miners were riding upon a bucket in which some pieces of lagging were being hoisted; neglecting to lash the top of the poles securely they came in collision with one of the timbers of the shaft, the cable was broken and the bucket, with its contents, was precipitated to the bottom with fatal results.

Other cases might be cited to prove that the practice referred to is a dangerous one, but the fact is too apparent to need further comment.

The handling of heavy timbers has its quota of mishaps, such as the breaking of ropes, slips and sliding ground risks that are usually unavoidable.

Machine drilling in mines is not especially dangerous. The few accidents that come under observation happen while setting up the machine or from the giving away of ground upon which it stands. Small particles of steel from the drill are liable to injure the eyes by becoming imbedded in the cornea. They are, however, readily extracted by applying cocaine, and using a magnetized instrument of suitable size. If the foreign body penetrates into the interior of the eye, the loss of that organ is a probable result.

Accidents met with in loading and coupling cars are usually of a minor class, and are in the majority of instances due to the want of care on the part of the workmen thus engaged.

Accidents from the inhalation of poisonous gases is a subject of special interest to miners, on account of their frequent exposure while working underground. The best ventilated mines are not entirely free from this danger, and as a consequence, miners are sometimes overcome by breathing gases collected or generated in stopes on recesses that cannot be wholly purified. Where good ventilation has not been provided, as in shafts and tunnels projected by prospectors, the danger is proportionally increased. The attempt to return too soon after blasting has occasioned loss of life. The introduction of compressed air as a motive power in the larger mines is of signal service in this particular. After blasting the air is turned on and the obnoxious gases driven out before the men resume their labor. The candle test for unsafe air is observed by miners generally. They know that an atmosphere too poor in oxygen to support the flame of a candle is unfit to breathe, and precaution must be taken to avoid such localities when it is possible to do so. They should also understand that this test is not infallible. There may be, and often is, an admixture of gases capable of supporting the flame from a candle, and yet deadly when inhaled. Experienced miners cannot have failed to note the behavior of the candle flame under these conditions. It flares up with a pale bluish light, due to the presence of a gas known as "carbon monoxide." It is one of the most poisonous gases with which the miners come in contact. A product of imperfect combustion, it is generated by the detonation of explosive compounds, and being colorless, odorless and tasteless, its presence is only made apparent by certain symptoms produced by its poisonous action, when introduced into the blood by continuous inhalation.

Associated with the ordinary carbon dioxide which infests mines in as small a proportion as 1%, it may prove injurious. A combination of the two gases seems to increase the toxicity of each other. Carbon dioxide is fortunately less active than the monoxide; moreover, it has a slight taste and odor and can therefore be more readily detected. The two gases are generally associated together, and the chief concern is to be able to determine when their percentage in

*A paper read by Dr. G. W. King, Helena, Mont., at the Butte, Mont., session of the Mining Congress, Sept. 3, 1902. Specially reported for the MINING AND SCIENTIFIC PRESS.

the atmosphere has passed beyond the limit of safety.

It is true that a difference exists among individuals in regard to their susceptibility to the action of these gases. One may be overcome in a place where another suffers but slight inconvenience. This fact often encourages the latter to take unnecessary chances. Men of experience and judgment, however, rarely go into a place where the air is known to be bad without being prepared to retreat promptly upon the first indication of danger. What these indications are should be as familiar to the trammer as to the miner himself, for it is among the former class that accidents from inhalation of foul air is most liable to occur. Their work necessitates the handling of loose earth, which is more or less permeated by the gas which is easily freed by the disturbance and becomes mixed with the air we are to breathe. Poisoning by carbon dioxide is at the time so insidious that the warning symptoms are unnoticed until too late to escape.

SYMPTOMS OF POISONING BY CARBON DIOXIDE.—The smell and taste of the gas is usually quite perceptible, and this indicates its presence when the percentage is small; nothing more than a dryness of the throat and a slight headache may be experienced. In large amounts the headache becomes more intense, a peculiar throbbing pain is felt over the brow and back of the head. Vertigo supervenes and the sight becomes dim and the limbs weak. There is a nausea and vomiting. An uncontrollable desire to sleep comes on and the person falls never to rise, unless carried out immediately. In an atmosphere completely saturated with carbon dioxide, these progressive symptoms are not noted, for the reason that all is over in a very few moments.

The result is practically the same as being submerged in water. To rescue those who are insensible a systematic plan of relief should be adopted. To rush in excitedly but complicates the work, very likely adding to the number already disabled. By forming a relay of men and instructing the one who is to enter to apply a sponge or handkerchief saturated with water or preferably with vinegar over the mouth and nostrils, then go quickly forward, take hold of the one insensible and drag him to the entrance as far as he can with safety to himself, then retire to give place to the one who stands ready to succeed him, will render the rescue work less hazardous to all concerned. Operating in a shaft is more difficult and dangerous. When the descent is made by a bucket for any considerable distance through a poisoned atmosphere, it is impossible to stand erect within it and maintain an equilibrium after the paralyzing effects of the gas is experienced. A sitting or kneeling posture should therefore be assumed to avoid the possibility of being precipitated from the bucket. Should descent by ladder way be undertaken, a rope fastened about the waist and manned from above is recommended as a wise precaution. A second rope may be lowered, if necessary, and made fast to the person to be brought up by means of a loop drawn snugly around the body close under the arms. The act of hoisting an unconscious person by the aid of a rope must be conducted with reasonable care, the tension ought to be steady, lest too forcible contact with jutting timbers or rocks result in serious injury.

The treatment of asphyxia produced by inhalation of poisonous gases will be referred to in appropriate connection.

The prevention of mining accidents has been the subject of much study, and investigation is continually being made by engineers and practical mining men. Legislatures have also endeavored to surround the miners with additional safeguards by legal enactments. Improvement has certainly been made, and with the advent of electricity for the purpose of lighting and motive power further progress will be made evident in the equipment of mines that are to be operated in the future.

Were it possible to exclude the accidents which are clearly preventable, the occupation of mining would be less hazardous and the mortality lessened, a result most helpful and worth striving for, since at best there will be fatalities enough and to spare.

Taking the practical view, then, that with the best equipment and most efficient service accidents may and do happen, the care of the injured must be considered with reference to their immediate necessities. To be prepared for emergencies is the first essential. This refers to the few medicines and appliances that may be needed for temporary use. These articles should be kept in reserve at the most accessible station within the mine, and plain and concise directions for their proper and legitimate indications posted in a conspicuous place, that all may learn how and what to do for others in case of need. To avoid unnecessary complications, the list of articles must be limited to the actual requirements, enumerated, it would appear, as follows: One-half dozen bandages, 2½ to 3 inches in width and 1 yard in length; one package of absorbent cotton; one roll of adhesive plaster; one dozen safety pins; galvanized wash bowl, soap and towel; temporary splints for the limbs; a litter; one cylinder of compressed oxygen gas, with inhaling mask; medicines other than stimulants are not indicated. Two ounces of aromatic spirits of ammonia, with a small flask of brandy, are added for the latter. The medicines and dressings may be stored in a

tin box with a tightly fitting cover, and the whole protected from moisture. After an accident the danger to be apprehended to those who are severely injured depends in a measure upon the length of time which must elapse before medical aid can reach them. This period varies from a few moments to several hours, according to circumstances. During this interval of waiting what is to be done? In some instances nothing; in others prompt action must be taken to save life. Upon those who are present, or first to arrive, devolves the duty of attending to the immediate necessities, whatever they may be, as best they can. The demoralizing effect of an accident upon those who witnessed it is apt to be harmful in two ways: First, by causing delay when time is the important factor; second, by inciting too energetic attempts at rendering assistance. It is, therefore, well to remember that, however alarming the situation, calmness and presence of mind are all-important.

Undue excitement contributes to render the chances of success less certain, if not impossible. One who is competent to do the right thing whenever and wherever such service is imperative exerts an influence most assuring and helpful to those in peril, and to those who must assist in their care. Gentleness without timidity is of inestimable value in this service under all conditions.

In caring for the injured there are certain things to do, applicable in all cases, and we, therefore, begin by placing the individual in a recumbent and easy position, and proceed to loosen the clothing about the neck and chest, and if the patient is able to swallow and there is no excessive bleeding, external or internal, from wounds or contusions, a moderate amount of whisky or aromatic spirits of ammonia may be given as a temporary stimulant. If stunned and unconscious, no attempt to give fluids by the mouth ought to be made, owing to the liability of their entering the windpipe and causing suffocation. Cold water may with advantage be sprinkled upon the face to excite effort at breathing. Friction applied to the extremities, being careful to select those which are injured, is a healthy measure. Heat applied externally is indicated when the surface of the body is cold and the circulation feeble. When reaction has become established the limbs should be examined, one by one, and in the same careful manner the chest, abdomen and head. In this way the injuries cannot fail to be noted. When there is dangerous hemorrhage caused by wounds and fainting from loss of blood ensues, appropriate means to control it must be employed promptly. To arrest bleeding different methods are employed, all more or less mechanical. Pressure is the readiest and most effective means for the temporary control in urgent cases. To apply the fingers over the course of an artery and compress it sufficiently to shut off the current of blood requires but an instant, and this advantage in time is not to be overlooked, especially when a large vessel is wounded.

Troublesome bleeding from wounds in the palm of the hand is effectually checked by similar methods. Digital compression of the large arteries of the thigh is more difficult owing to the large mass of muscles by which it is surrounded. Resort must be sought in more effective methods. The limb should be elevated and a small, firm pad placed over the artery, then a handkerchief or piece of rope is made to encircle the limb over the pad, a sharp stick introduced into the loop and twisted upon itself until the bleeding is effectually controlled.

Cold is an effective means of checking oozing from small arteries or veins. Ice, snow or cold water is placed in contact with the bleeding surface. Heat is equally serviceable, and is applied by means of compresses dipped in hot water. In deep wounds, when the source of bleeding is obscure and the condition of the patient critical, packing the wound with strips of gauze, or with absorbent cotton, is permissible. After removing blood clots the gauze or cotton is forced into the bottom of the wound, and the cavity filled and a bandage firmly applied to the parts. In these manipulations absolute cleanliness is to be insisted upon to prevent infection. The hands of the operator should be thoroughly scrubbed with soap and water, and the dressings kept free from contamination with as much care as possible.

Internal bleeding, induced by serious injuries, is, unfortunately, not amenable to active treatments, and we must content ourselves with insisting upon perfect quietude, administering cool drinks, and applying cold compresses over the affected region. These simple means may appear insignificant and of doubtful utility in the presence of grave conditions, and the temptation to do something more radical in the way of treatment is at times difficult to resist. A moment's reflection upon the indications to be met should establish the fact that the immoderate use of stimulants or active movements of the patient tend to deviate the object we have in view, viz.: to favor the formation of a clot at the point of rupture of the artery or vein—nature's method of arresting hemorrhage; fainting is a saving incident and may be so regarded, unless the weakness is progressive and the shock so profound as to threaten immediate death. In the latter emergency, stimulation and warmth must be the treatment. It is to be understood that surgical skill is required to deal with such extreme cases. The suggestions above outlined

are for the benefit of those who are uninstructed in the treatment of severe injuries. First aid applies only to the temporary care of those who are disabled and helpless; with that its utility ceases. Some injuries disable without endangering life, as instances in the case of fractures of the limbs. Here some support is needed to steady the fragments during transportation. The resuscitation of those who have been overcome and rendered unconscious by inhalation of poisonous gases is necessarily first aid work. The question of how to accomplish this object must be considered. Little can be done before removal to a location where the air is comparatively fresh. Then cold water dashed into the face and friction applied to the limbs will stimulate the resumption of breathing. Should it fail to do so, artificial respiration must be resorted to at once. It consists of forcing air into the lungs by imitating the natural act of breathing. The steps of the procedure are as follows: Place the patient upon his back with head and shoulders slightly elevated; loosen the clothing and cleanse the mouth and nostrils; pull the tongue forward and bring it out at the angle of the mouth, to remove all obstruction to the entrance of air. The operator then kneels at the head of the patient, and, reaching forward, grasps the arms near the elbows, carries them up in an extended position. This maneuver creates a vacuum in the lungs, allowing air to enter; the arms are held in this position for two seconds, then carried downward and pressed firmly against the sides, forcing air from the lungs by compression. This to and fro movement is kept up at the rate of fourteen to fifteen per minute, until there is a return of natural breathing, usually shown by a voluntary gasp on the part of the patient. This is the most reliable of all methods of restoring suspended animation, caused by inhaling carbonic dioxide; air must be gotten into the lungs, either by force or natural act of breathing. Otherwise the case is hopeless. This is true for physiological reasons, which can not be discussed here; suffice it to say that under normal conditions oxygen freely enters the blood by way of the lungs, and its presence there is essential to life. As soon, therefore, as the breathing becomes regular, the inhalation of oxygen gas may be begun and continued until the livid color of the skin becomes less marked and consciousness returns. In the absence of the oxygen gas, stimulants are next to be thought of, as soon as there is ability to swallow. Whisky or aromatic spirits of ammonia are choice. Ammonia has the property of quicker action, but less durable than that of alcohol. Sniffing the fumes of ammonia is also useful. When patients begin to revive there is apt to be cramping of the limbs, or general convulsions. This requires no treatment beyond protecting them from injuring themselves by the convulsive movements. The cases need watching for some hours, for it may happen that those who are apparently out of danger will suffer a relapse and become again unconscious and die if left to themselves. The lifting and carrying of the injured is apt to be awkwardly done by men inexperienced in such service. Many injuries are of such a nature that misapplied force will further complicate the lesions which already exist, if indeed it does not lead to irreparable damage. A simple fracture of the leg may be converted into a compound one by injudicious handling. An unnecessary laceration of tissue is produced and consequent suffering, besides adding to the gravity of the case. This is but one of the many things which may happen to the disadvantage of the patient during transportation. To lift an injured person properly requires three bearers. Two should stand upon opposite sides in a position to support the upper part of the body; the third where he can conveniently take care of the lower extremities. Then, with the patient upon his back, all drop upon one knee, the two principal bearers, pushing their arms under the back, lock hands firmly together. The third pushes both arms under the limbs. At a given signal all arise to their feet. The weight is thus so evenly distributed as to be easily borne, and there is no appreciable jar or sudden twisting of injured parts.

A litter devised by the writer is adapted for underground work and insures safety in whatever position it may be placed. By its use in mining accidents the difficult problem of getting those severely injured to the surface, without discomfort or danger, is satisfactorily solved. The litter, with its burden, may be put upon a cage or in a bucket, and, when fastened in appropriate position, can be brought up without disturbing the position of the patient. To the litter a rope is attached to one end, and a guy line to the other, the latter being used to steady it during transit. When the upright position can not be maintained—owing to syncope, from loss of blood—a semi-horizontal or even reverse position may be chosen for the time being, in order to allow the remaining blood to gravitate towards the heart and brain, an expedient that is sometimes useful in extreme cases. The fastenings are so arranged that the position of the patient is not changed with reference to the litter while executing the different movements of hoisting or transporting through narrow passages, thus affording additional security and dispensing with an extra number of bearers. In practice this plan is proven an excellent one. The litter is inexpensive and durable; after being brought up to the surface, the injured are given over to the care of a physician, or placed in an ambulance for conveyance to the hos-

pital, and the duties pertaining to the first aid are practically ended.

In rendering first aid to the injured simple methods are to be preferred; they are always available and, moreover, within the comprehension of anyone possessed of ordinary intelligence, and can by them be easily put in practice at the time and place most urgently demanded.

Officious and meddlesome interference is to be avoided. It is never necessary and may do harm. There are certain definite things to be done in sudden emergencies. Common sense and prudence should indicate the course to pursue in every instance. The rule to do no harm is a good one and should be kept in mind at all times. Its observance is never a cause of regret, but, on the contrary, an evidence of a true desire to keep within the limits of safety—a most commendable qualification in the non-professional when called upon to take an active part in the care of the injured.

The Value of Topographic Maps.*

The value of topographic maps to the geologist, to the engineering fraternity, and to those interested in the general development of a region, is already established.

The topographic work of the Geological Survey may be divided into three classes:

First—the exploration work, which is primitive in the extreme and depends upon rough sketches and notes made while traveling between points distant one from the other, and the compilation of this data.

Second—The standard sheets, which are the product of the actual survey of an area in which the numerical values are completed—the measurement of horizontal distances and the elevations computed.

Third—The “special” maps of areas important to mining men, where development is in progress or to be begun.

The first of these is of more importance to the prospector—often is the only guide he has in a new region. They are small in scale and usually cover the forest reserves and such regions as Alaska.

The second and third are directly of use to the mining man.

The standard sheets are made at a scale, usually, of 1 inch to 2 miles, with contour lines 100, 50 or 25 feet apart, as determined by the ruggedness of the region under survey, which show the relief, the slope and height of the hills and mountains, and the grade of streams and configuration of the valleys. Cities, towns, roads, trails and isolated houses outside of towns, and the township corners and lines exactly as found, are shown. These sheets are the size of a small newspaper page, and include an area of about 400 square miles each.

The “special” maps show everything enumerated for the standard maps, and, in addition, the buildings, street railways and alleys in the towns, the section corners, “quarter” corners, all mines and the important prospect holes. The interval between the contour line ranges between 10 and 50 feet, and the scale between 800 and 2000 feet to the inch.

The field work of topographic mapping is of three varieties:—

First—The primary control, which consists of a few carefully computed points—which are located by triangulation.

Second—The spirit leveling, upon which depend all the measurements of heights and contouring; and

Third—The drawing, in the field, of the map upon this data, for which the plane table and telescopic alidade in connection with a telemeter rod is used.

The standard sheets are of such accuracy that with a little experience the mining man can locate his property upon the map with reference to its elevation above sea, its distance from mountain peaks, streams or towns. He can determine approximately the length of a trail or road to his property, together with the necessary grades; the location of a mill or smelter site, the head works and length of ditch necessary to bring him water, and the feasibility of constructing a railroad connection should the development of the property warrant it.

The “special” maps may be used to better advantage for all of these purposes, but as they necessarily cover a smaller area, the relationship of the information to distant points cannot be so well determined.

Upon these maps the mining claims may be plotted, or measurements made from definitely marked points on the map to croppings or other geological features, and so the surface position may be determined.

The standard sheets have been completed of an area of many thousands of square miles, and many special maps have been published. Of the latter I might mention the following: Aspen, Leadville and Telluride in Colorado; Marysville and Nevada City in California; Globe, Clifton and Bisbee in Arizona; Butte, Marysville and Elkhorn in Montana, and many more.

These maps of the survey are engraved, printed in three colors—brown expressing relief, blue the water and black the artificial features, roads, houses, etc. This helps one to an intelligent and rapid reading of the map.

In Montana there are about twenty sheets com-

pleted; but many of these are an intermediate grade between those of exploration and the standard. These are one inch to four inch scale, with a contour interval of 200 feet. This work is no longer done. There are on the table a number of maps of the adjacent region and of the various portions of Montana, which I hope those interested will inspect.

Comparative Cost of Air Compression.

In a paper read by W. Thompson, Rossland, B. C., at the Nelson meeting of the Canadian Mining Institute, Nelson, on the 10th inst., the author gives comparative costs of compressing air with steam and electricity at Rossland. In the paper Mr. Thompson says that the question of the selection of power supply to be made by mine managers at Rossland is almost entirely removed from chance, and may be based on ascertained facts. Railways being at hand for the transportation of any kind of machinery, reasonably cheap fuel in quantities required is assured, and electric power for any size machinery or service is available. Therefore the problem simply resolves itself into: Which of these powers will give the best service in operating the machinery used in connection with mining operations?

The steam plant was erected for the Le Roi M. Co., Ltd., and consisted of two 250 H. P. water tube boilers, arranged to burn coal as fuel, intended to generate steam to run the air compressors, and set so as to work, if desirable, in connection with nine 125 H. P. steel shell return tubular boilers, designed to operate the hoisting and surface plants, these boilers arranged to be interchangeable to either service. During the test the water tube boilers were used at a gauge pressure of 150 pounds per square inch, using Crows Nest coal as fuel, which cost, delivered, \$5.55 per ton of 2000 pounds. The steam driven air compressor plant consisted of two compound condensing Corliss valve engines, direct connected to two-stage air cylinders, equipped with intermediate cooling devices, each machine having a rated capacity of 4000 cubic feet of free air per minute, or a combined capacity of 8000 cubic feet of free air per minute at sea level. A more detailed description of these engines would be as follows:

	No. 1 Engine.	No. 2 Engine.
INCHES.	INCHES.	INCHES.
Diameter high pressure steam cylinder.....	22	22
Diameter low pressure steam cylinder.....	36	36
Diameter high pressure air cylinder.....	22	22
Diameter low pressure air cylinder.....	36	38
Length of stroke.....	48	48

Intercoolers, horizontal multitubular type; condensers, independent jet.

The electrically driven air compressing plant was erected by the Rossland Great Western Mines, Ltd., originally intended to be operated in connection with the steam plant described, to supply power from a central station to four mines, owned by different companies. This arrangement would have given each mine power at the lowest possible cost, and have ensured continuous operations by reason of the compressing plant being arranged in separate units. Each company would pay its share of operation—maintenance of plant—pro rata to its consumption of air. When it was found necessary to erect the third unit to the compressing plant, difficulties presented themselves in the shape of shortage of water for condensing and cooling purposes. On examination it was found that a satisfactory supply could not be secured without heavy capital expenditures for erection of flumes, etc., to convey the water to where it was required for use. It was, however, found that a supply of water, barely sufficient for the intercoolers and water jackets, was available $\frac{1}{2}$ mile distant from the steam plant. This supply was so located that it must either be pumped or else the plant located at this distance away from the main steam plant. By conserving this water supply—cooling and reusing—it was decided a sufficient supply of water for the air cylinder jackets and intercoolers could be secured. The results obtained from the steam plants had proven satisfactory. It was considered questionable if any electric plant could be installed that could successfully compete with steam, even when running non-condensing, unless very favorable rates for power could be secured. It was decided to erect an electrically driven plant, three-phase, synchronous motor, designed for 2200 volts, rated capacity 660 K.W., equivalent to about 825 H. P.; a 54-inch clutch set intermediate between the driving pulley and the motor, the latter of a four-bearing type, fitted with self-aligning and self-oiling sleeves; driving pulley 60 inches diameter, grooved for twenty-two $1\frac{1}{2}$ -inch ropes, 270 revolutions per minute.

All tests were conducted under the personal supervision of the writer, and extreme care was taken to arrive at actual facts. Indicator diagrams were taken off both the steam and air cylinders every half hour, and the results tabulated. Coal consumed was weighed, and all other supplies, such as waste, oil, etc., charged as used.

Readings were also taken and recorded, by means of a kilowatt meter connected to the primary mains,

of the amount of electric power used. The test extended over a period of thirty days, without interruption, both plants being run under exactly similar conditions as to air pressure.

Each of the plants tested, being modern and representative of their respective types, gave favorable opportunity for a comparative test. The average results of the thirty days' test are given as follows:

TABLE I.

WORK PERFORMED BY STEAM PLANT.	
Average indicated horse power at steam cylinders of the combined machines.....	730
Free air compressed per minute from atmospheric pressure to 95 pounds per square inch, cubic feet.....	5,432
Free air compressed per hour, cubic feet.....	325,920
Average horse power required at steam cylinders to compress 100 cubic feet of air per minute to gauge pressure.....	13.4
Pounds of coal consumed during test.....	1,038,000
Pounds of coal consumed per day of 24 hours...	36,400
Average pounds of coal consumed per horse power per hour during test.....	1.9

TABLE II.

WORK PERFORMED BY ELECTRIC PLANT.	
Average horse power registered at switchboard..	540
Free air compressed per minute from atmospheric pressure to 95 pounds gauge pressure.....	3,319
Free air compressed per hour.....	199,140
Average horse power required at motor to compress 100 cubic feet of free air per minute to 95 pounds gauge pressure.....	16.3

TABLE III.

COST OF OPERATING STEAM PLANT.	
Total cost fuel consumed during test.....	\$2,880.45
Total cost of wages for employees.....	710.00
Total cost of oils, waste, etc.....	147.30
Total cost for 30 days, exclusive of maintenance and depreciation.....	\$3,737.75
Cost per H. P. per month for fuel.....	3.96
Cost per H. P. per month for oil, etc.....	0.20
Cost per H. P. per month for wages.....	0.97
Cost per H. P. per annum.....	\$5.13
Cost for each 100,000 cubic feet of free air compressed.....	61.56
Cost per drill shift.....	1.25

NOTE.—Eighty thousand cubic feet taken as the average consumption per shift of one $3\frac{1}{2}$ -inch drill.

TABLE IV.

COST OF OPERATING ELECTRIC PLANT.	
Cost of current for 30 days.....	\$1,744.26
Cost of employees' wages.....	270.00
Cost of oils, waste, etc.....	73.00
Total cost for 30 days, exclusive of maintenance and depreciation.....	\$2,087.86
Average cost per H. P. per month.....	3.87
Average cost per H. P. per annum.....	46.44
Cost for each 100,000 cubic feet of air compressed.....	1.46
Cost per drill shift.....	1.17

NOTE.—Eighty thousand cubic feet taken as the average consumption per shift of one $3\frac{1}{2}$ -inch drill.

RESUME.

SHOWING COMPARATIVE RESULTS BETWEEN THE TWO TYPES OF COMPRESSORS, BASED ON EACH 100,000 CUBIC FEET OF AIR COMPRESSED FROM ATMOSPHERIC PRESSURE TO 95 POUNDS RECEIVER PRESSURE.

Cost for each 100,000 cubic feet of free air compressed by steam plant (see Table III).....\$1.56
Cost for each 100,000 cubic feet of free air compressed by electric plant (see Table IV).....\$1.46

The saving shown in the resume would be affected adversely if the electric plant was operated singly and the entire air compressed was not used, for the reason that electrically driven compressors must be operated at constant speed, and loss of air at safety valve would be considerably increased over the same loss at steam plant, which could be run at the speed required to compress the amount of air actually required. This loss would, however, be slightly offset by the increased cost per horse power by working the steam compressors on underload.

The results of a number of tests made on the efficiency of the intercooler are shown as follows:

Temperature of cooling water at inlet of intercooler.....	42°F
Temperature of cooling water at outlet of intercooler.....	50°F
Rise in temperature of cooling water while passing through intercooler.....	8°F
Temperature of air at outlet of low pressure cylinder and before passing through intercooler.....	196°F
Temperature of air at inlet of high pressure cylinder after passing through intercooler.....	54°F
Reduction in temperature of air after passing through intercooler.....	142°F

PLATINUM ANODES are attacked more readily in concentrated than in dilute hydrochloric acid. In an acid of given strength the attack diminishes as the current density increases. This is explained by the diminution of the concentration of the acid in contact with the anodes which is produced by the current, the diminution being greater with high current density. Platinum-iridium is less liable to attack than platinum.

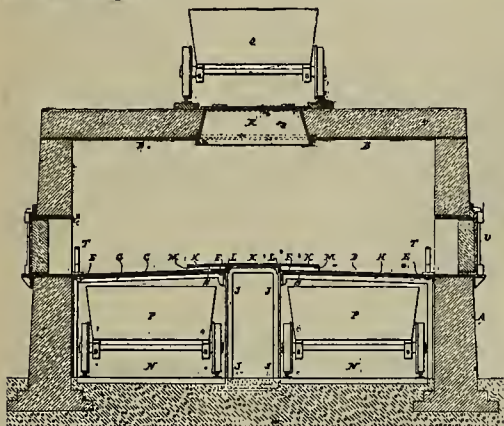
*A paper read by R. M. CHAPMAN at the Butte, Mont., session of the Mining Congress, Sept. 3, 1902. Specially reported for the MINING AND SCIENTIFIC PRESS.

Mining and Metallurgical Patents.

Patents Issued September 2, 1902.

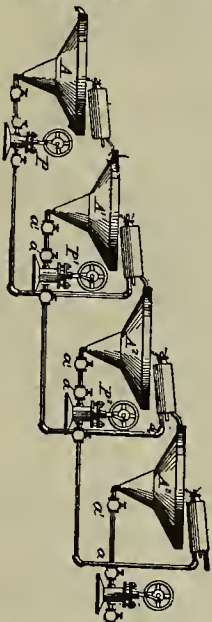
Specially Reported and Illustrated for the MINING AND SCIENTIFIC PRESS.

UTILIZING WASTE HEAT IN CONNECTION WITH SMELTING FURNACES.—No. 708,018; R. Brown, Southampton, England.



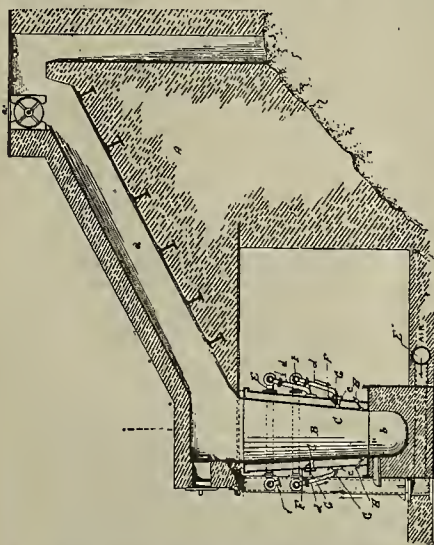
Apparatus for utilizing waste heat in connection with smelting furnaces, comprising covered chamber to receive materials for furnace, having floor supported so as to form flues to receive hogies containing hot products from furnace, floor having openings adapted to allow air heated by contact with hot products to ascend through materials thereon.

APPARATUS FOR EXTRACTING METALS FROM ORES.—No. 708,494; J. Randall, Deadwood, S. D.



In an apparatus for treating ores, series of tanks with outlets at bottom, series of agitators adapted to discharge contents into tops of tanks, means for conveying contents of each into agitator directly above adjacent tank for discharge into the latter, each tank having lip with discharge leading into ore receiving end of agitator, whereby ore and fluid pass through agitator in same direction, parts being combined as described.

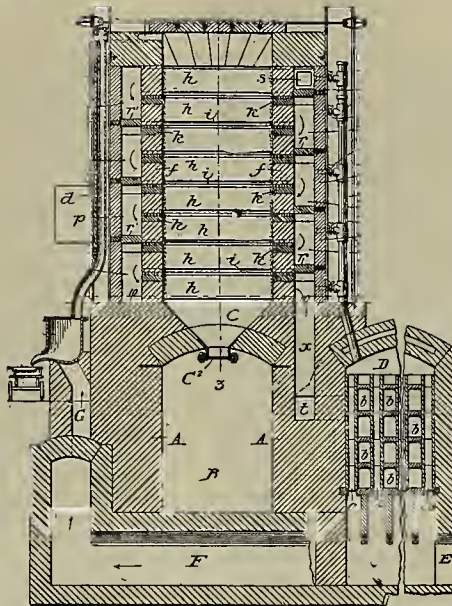
IRON BLAST FURNACE.—No. 708,116; M. P. Boss, San Francisco, Cal.



In a blast furnace, waterjacketed fire chamber, air

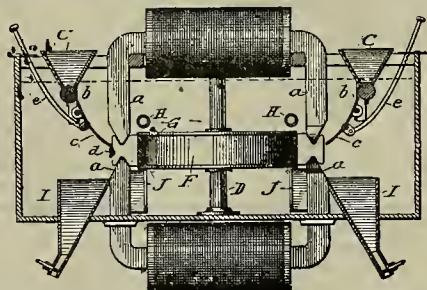
blast tuyeres, C, extending through and supported at opposite aligned points in opposite walls of chamber, oil feeders passing through water-jacket of said chamber leading into tuyeres, and valved feeder pipes, H, below tuyeres, C, also extending through and supported at aligned points in opposite walls of water-jacket.

ZINC FURNACE.—No. 708,438; W. C. Wetherill, Joplin, Mo.



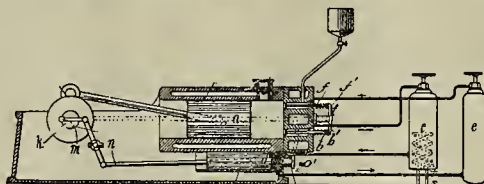
A zinc furnace, provided with series of relatively deep, long and narrow charge-containing chambers, separated by removable combustion flues, consisting of hollow tiles located one above the other extending entirely across chambers, supported at their ends upon partition walls, ends of tiles being joined by connecting passages beyond partition walls, luting material located in recess between top of one tile and base of another throughout series, whereby furnace may be charged and discharged without dismantling it, destructive effects of slag largely obviated and loss of zinc by absorption materially reduced.

MAGNETIC SEPARATOR.—No. 708,185; J. P. Wetherill, South Bethlehem, Pa.



A magnetic separator, consisting of upper and lower U-shaped magnets, whose poles are so arranged as to form magnetic circle with two gaps, outlying hoppers for supplying to gaps material to be separated, jet pipes whose jets are directed through gaps on opposite side to feed, endless belt carrying scraper blades having path of movement successively through gaps, laterally disposed hoppers to receive non-attracted particles, and end hopper to receive attracted particles as they are conveyed to it by the scraper.

INTERNAL COMBUSTION ENGINE.—No. 708,029; R. Diesel, Munich, Germany.



In an internal combustion engine, combination of working cylinder and piston, working cylinder having mechanically controlled inlet and valved outlet for air or combustible mixture; fuel feed valve and exhaust; source of supply connected to inlet for air or combustible mixture; compressing pump, having inlet and outlet; connection between inlet of compressing pump and mechanically controlled outlet of working cylinder, receiver interposed in connection between outlet of compressing pump and fuel feed valve of working cylinder; means for operating compressing pump.

PROCESS OF MAKING SODIUM CYANIDE.—No. 708,079; F. Roessler, Frankfurt, Germany.

Treating mixture of sodium cyanide and sodium

carbonate with insufficient water to dissolve cyanide completely, forming lye, separating lye from mixture, again treating remaining mixture with such quantity of water as is necessary to dissolve all cyanide left in mass after first treatment, forming second lye, lixiviating fresh quantity of mixture of sodium cyanide and sodium carbonate with second lye, whereby sodium carbonate in solution is displaced by sodium cyanide, depositing crystals of sodium cyanide by cooling, fusing crystals of sodium cyanide in their water of crystallization at about 33° C., whereby cyanide is separated in a free state from water.

Ore Roaster Decision.

"We will uphold the decree of the circuit court of Kansas in the case of the Lanyon Zinc Co. against Horace F. Brown et al."

These were the words of Judge Caldwell this morning in rendering a decision in a case involving the right to the use of a patent ore roaster. An oral decision was rendered, Judge Hallett sitting as associate justice.

To hear the case dismissed in a few words gave no impression of its magnitude and one not familiar with the issue would not imagine that millions hung in the balance.

The case dates back several years to when Brown obtained letters patent on an improved ore roasting furnace. Later the Lanyon Zinc Co. used and manufactured an ore furnace of similar construction. The latter company conceded the furnace to be of a similar nature to Brown's, but claimed that it was superior in many respects and was not an infringement on his patent. In the original suit Brown asked for a restraining order and \$850,000 damages.

Judge William C. Hook of the circuit court of Kansas rendered a decision favorable to Brown. It was adjudged by the Kansas court that the furnaces manufactured by the Lanyon Zinc Co. were constructed in substantial accordance with the letters patent held by Brown, and that it was done without license and authority and that by so doing the patentee's rights were infringed upon. The decree ordered the Lanyon Zinc Co. and the Pittsburgh Foundry & Machinery Co. to desist from further infringement.

The decree also ordered that the complainants were entitled to the recovery of the profits which had accrued to the defendants from the infringement by the manufacture, sale and use of the patent.

The decision of the circuit court of appeals was a surprise to Attorney John H. Atwood of Leavenworth, who was defending the Lanyon Zinc Co.

The accrued profits which Brown will receive from the defendants now amount to something more than \$1,000,000. The patent right is said to be worth \$500,000 a year.

It has been stated the case involves the steel trust and the Standard Oil Co. The Standard Oil Co. is said to be the chief owner of the Lanyon Zinc Co., which must now either close or pay a royalty of about \$500,000 a year for the privilege of using the Brown furnace, which it is averred is owned by the steel trust.—Denver, Colo., Dispatch, Sept. 7.

Oil Fuel for Ocean Steamships.

The report of Lieut. W. Winchell, U. S. N., detailed by the Navy Department to observe the installation and efficiency of the oil fuel system as fitted to the Oceanic Steamship Co.'s steamer Mariposa, states that the Mariposa's gross displacement was 3160 tons, her average was 354 knots, a mean speed of 13.58 knots, with 278 barrels of oil per day. This was 50% less in weight than would be required of coal, for one and one-half pounds of oil sufficed to produce a horse power. An advantage in the oil fuel was the reduction of the engine room force from thirty-six to twenty men. The ship used only twelve of her eighteen furnaces, burning crude oil in two burners in each furnace by means of an air compressor of a capacity of 1000 cubic feet per minute at thirty pounds pressure. All of the burners were not used, except at short intervals. The entire refuse after a run of 3434 miles from San Francisco to Tahiti barely filled two ash buckets; the flames did not affect the boilers unfavorably.

Difficulties experienced were confined to the choking of the strainer, which can be obviated by duplicating those parts and in the regulation of the supply of oil to the feeders. When the air compressor needed overhauling, in one or two instances, recourse was had to a steam spray, which wisely had been provided.

Lieut. Winchell says that while fewer men are needed in the fire-rooms with oil it is necessary to secure men of higher intelligence, with technical aptitude and nerve, closely to watch the furnaces. The essentials are that there should be a constant air pressure for atomizing; that provision shall be made to maintain regular temperature of the oil, and that the oil strainers be watched steadily.

He says that the Mariposa's trip was remarkable in many respects, and was a tribute to the skill of the Pacific mechanics and to the enterprise of the company which first installed the oil burners in lieu of coal.

Mining Summary.

Specially compiled and reported for the
MINING AND SCIENTIFIC PRESS

ALASKA.

F. C. Helm of the Valdez. Copper River & Yukon Co. asserts that 35 miles of the Valdez-Eagle railway will be built this year, and that the entire 400 miles will be completed within two and one half years. He says that the contract for the building of the road has been let to J. P. McDonald of New York for completion in that time, and that rails for the road are on the water between Seattle and Valdez, to be distributed by September 20.

The Nazina gold diggings in the Copper River valley, 200 miles inland from Valdez, are reported rich. On Rex gulch, in three days, four men are said to have sluiced out \$1500 in one sluice box. This streak extends along the gulch. About 400 claims have been staked in the district. The remarkable feature of mining on the Nazina is the filling up of sluice boxes with native copper. Nuggets vary in size from a pinhead to 100 pounds in weight. The whole bedrock is covered with this copper along with the gold.

ARIZONA.

GRAHAM COUNTY.

The leaching process for the ores of the Lone Star district is reported a success. Manager Williams at the leacher, near Safford, has 500 tons ore taken out of the Horse Shoe mine, which has been thoroughly tested, averaging 5% copper with small values of gold and silver.

A trainload of copper passed over the A. & N. M. last week—the first regular freight train over the new extension from Lordsburg to Hachita, where connection is made with the El Paso & Southwestern. The Era says that fifteen cars of the copper ore came from Clifton and seven from Morenci, averaging thirty tons each—660 tons. At 10 cents per pound this shipment is worth \$132,000.

C. P. Rosecrans, manager Standard copper mines, says that 125 tons ore were shipped from the mines last week to the A. C. Co. for treatment, and on September 1st forty-five tons more were shipped. The ore averages 20%.

H. Firth has charge of the property of the Aravaipa M. Co.—nineteen silver claims.

W. B. Thompson, president, and H. S. Anderson, treasurer, of the Coronado M. Co., are at Clifton to put men to work developing the property.

MARICOPA COUNTY.

The Eddy G., S. & C. M. Co. has claims in the White Tank mountains, 30 miles west of Phoenix, that will be developed by Eddy & Donofrio of Phoenix.

Near Wickenburg, the White Gold M. Co. has six claims, most of the work being done on the Right Bower claim. Three tunnels have been run, the longest 125 feet. The ore carries \$18 gold, silver values extra. About 700 feet of work has been done on the property and three shifts will be started next month, running the tunnel through the mountain, giving a depth of about 700 feet. Water in the river at the mouth of the tunnel furnishes an abundant supply for a 100-stamp mill. It is the intention of the company to erect a mill. B. F. Porter is general superintendent.

MOJAVE COUNTY.

Kingman expects the Schuykill mine to start up soon. Manager O'Neill will sink to a depth of 1000 feet and carry on exploration from that point.

Salt Lake men have located several thousand acres of placer land near the old Senator mill and a number of quartz claims that show width and values in the outcrop.

The Minnesota mine has an ore body on the 400-foot level that, shipped direct to the smelter, averages in carload lots 320 ounces silver and 2½ ounces gold to the ton.

The Oro Plata mine has been unwatered and miners are crosscutting to the foot-wall vein.

The Homestake mine below Kingman is to be equipped with a reduction plant.

The new machinery for the Nighthawk mine is on the summit above the mine, ready to be skidded to the tunnel where it is to be installed.

A tri-weekly stage line has been put on between Needles and the Boundary Cone camps, sixteen miles.

PIMA COUNTY.

Tucson reports a movement toward construction of a new railroad through the mining section of southern Arizona and the erection of a custom smelter at Tucson. When copper went down, many of the mines situated at a distance from the Southern Pacific Railroad could not afford

to haul their ore to Tucson and then ship it by rail to El Paso. With prospects for both a railroad and a smelter at Tucson, the mine owners would resume development work.

H. E. Cook, a representative of Boston men, has completed inspection of the route of the proposed America-Mexican Pacific Railroad, and has returned to Boston to recommend that they take the bonds of the railroad. W. W. Robinson, representing San Francisco men is making contracts with the mine owners for ore, which they guarantee to deliver at a custom smelter, which Mr. Robinson will erect at Tucson. Those contracts guarantee nearly 1000 tons of ore daily.

J. P. Owen, manager Sierreta M. & M. Co., operating the Banner mines in the Sierretas, has returned to Tucson from New York, accompanied by G. B. Lindeman, president of the company, S. D. Kynor, secretary, and J. H. Davis, a director. They will visit the mine to determine the advisability of erecting a mill. The Post hears that Manager Owen is engineering a deal to secure control of the mines at Oro Blanco.

The Ronquai M. Co. is organized in Boston to work the Loma Verde mines, in the Rincon mountains; incorporators are all women.

YAVAPAI COUNTY.

The Prospect says the Val Verde smelter had trouble and shut down on account of floods in the Agua Fria river, from which it gets its water, but is again running all right. The copper supply is coming chiefly from the Butternut mine, owned by the Butternut Gold & Copper M. Co.; they are also getting shipments of siliceous copper ore from the Cornucopia mine.

The Bretherton hot blast is giving satisfaction; it enables them to get along with about one-third the usual coke and dispenses with roasting.

The machinery for the concentrating plant of the Standard S. & R. Co. is on the ground at Val Verde ready to be put in place; minimum capacity of plant, eighty tons a day. A 10-stamp mill to handle the free milling ore will be run in connection.

The new mill of the Oriental M. Co., Big Bug, is on ore from the Postmaster mine.

The second hole of the Hercules M. Co. is down 510 feet. The last 5 feet have been in breccia formation. H. E. Armistage is using a diamond drill.

The Iron King mine, at Big Bug, has put in a steam hoist. Manager Blanchard projects a 10-stamp mill and a 50-ton cyanide plant.

The Cash mill, near Prescott, is daily turning out five tons of concentrates.—A. Ratcliff is taking out rich ore from the Queen mine, 12 miles west of Prescott.—The 40-ton ore reduction plant of the Oriental M. Co. is completed and running steadily on a good grade of ore.—The Hassayampa Gold Dredging Co. expects to operate on the gold-bearing beds of the Hassayampa, near Walnut Grove. Experts have tested the gravel and as high as 50 cents in gold dust has been obtained from three pans.—The Iron King group, near Mayer, is to have a 10 stamp mill and a 50-ton per day cyanide plant.—The Lion G. M. Co., Cherry Creek, has machine drills sinking the shaft, which is now down 400 feet. The shaft will be put down 500 feet before any drifting is done.

On the United Verde mine present conditions the master mechanic, Adamson, of the Copper Queen Co., Bisbee, Cochise county, says: "It is hard to say how the management of the United Verde will succeed in flooding the mine to the extent of extinguishing the fire. The only supply of water that would be adequate is in the Verde river, which is 7 miles distant. To raise the water to the height required would require at least two stations of pumps of immense horse power. This would probably prove sufficient to lift the water, as Jerome is 5500 feet high. But when the water is raised there, have we any assurance that this will extinguish the fire? It is known to everyone who has been to Jerome that the mountain is split in every direction, which would permit the water to run off indefinitely. The question arises then, can these clefts leading away from the mine be sufficiently bulkheaded?"

"Granting they sufficiently close the mine or bulkhead it, so called, will that extinguish the fire? The level upon which the fire first broke out was closed tight for nine months, when a stream of water continually poured in upon the fire. It was thought that would be sufficient, but that level was not opened again three weeks before the fire broke out as strong as ever. The problem of extinguishing a fire in a mine is one that is not solved thus far, when it assumes proportions like that of the United Verde. The Anaconda mine at Butte has been on fire for the past

twenty-two years and they have never succeeded in putting it out.

"The effects of the shut down of this mine is hard to estimate, for it is not confined to Jerome or the United Verde alone. With the great growth of the United Verde the surrounding country has in a large degree depended. There are 2000 men on the pay roll at Jerome who depend upon the United Verde for a livelihood. Many of them have homes there which they have built. They will, of course, be thrown out of employment. The town is about 4000 in population which, of course, must depend upon the miners, and when the miners go they must go, for what is there for them after the mine ceases to operate? Jerome Junction, employing fifty or more men to transfer the copper which is shipped out of the mine to other railroads, will certainly have no further use for the men and the support of this town is suddenly withdrawn. There is quite an extensive farming population in the Verde valley, who depend very largely upon the Jerome market. These will have to find other markets for their products. Prescott received a great revenue from that mine, directly and indirectly, which will be taken, and it must be remembered that owing to recent fires people of Prescott and Jerome are both heavily in debt.

"The railroads will certainly be affected, for the engines running from Jerome Junction to Jerome hauled twenty trains daily. It is easy to see where this traffic would be minus and where railroads would be affected by it and where these crews would be out. This would affect the traffic from that point to New York. These trains are used to carry ore and passengers out and coal supplies and passengers in.

"The mines are supplied with coal from the Clarksville mines near Gallup, N. M., a mine owned by W. A. Clark and operated to supply the mine at Jerome. This will be very materially affected if it should no longer be operated to supply the United Verde, for it is situated too far back from the railroad for advantage. There are several hundred men employed in these coal mines."

YUMA COUNTY.

J. W. Bursen, of the Socorro mine, has a shaft 370 feet deep, with 6 feet sulphide ore on the bottom, average value, \$22 per ton gold. He expects to have a 20-stamp mill in operation next month.

CALIFORNIA.

AMADOR COUNTY.

Near Pine Grove, the Mitchell mine has closed. Superintendent Hyner expects to arrange with the owners for further sinking.

At the Zella heavy square timbers and other lumber are being hauled to this mine, preparatory to retimbering the shaft 400 feet.

The Standard Electric Co. is moving all the machinery from Bear river to Blue lakes. When all the dams are finished the company will have a large body of water in reserve for dry seasons. About 240 men are working on the different dams.

CALAVERAS COUNTY.

The Sierra railway will begin running regular freight and passenger trains into Angels on the 15th.

A. P. Morris of the Black Cat O. & M. Co. has bought the Occident-Keystone property. H. E. Branthaver, J. E. Seroy and W. T. Robinson are in the purchase. The price paid was \$68,000. The Occident-Keystone is an extension of the Old Boston, or Esperanza mine. The sale includes mill site and timber land. Two tunnels are in pay ore and water and electric power are on the property. Arrangements are making for an increased number of stamps, power drill, compressor and cyaniding plant. W. T. Robinson will superintend operations at the mine.

COLUSA COUNTY.

The dispatch in the dailies from Willows about finding gold in the town, in ground where a cellar was being dug for Legg & Shaw, contained some mistakes which should be corrected. First, there is no two-story brick building being constructed in that town; second, there is no Legg & Shaw Co.; third, there is no Main street in Willows, and, lastly, there has been no gold found. Deducting these errors, the dispatch was all right.

EL DORADO COUNTY.

The El Dorado W. & D. G. M. Co. will reopen its gravel mine at Texas Hill. F. Goyan will be in charge.

KERN COUNTY.

The Randsburg Miner says last week's milling of ore from the Butte Lode Co. of eighty-nine tons returned three bars of bullion worth approximately \$5900. The production of this mine for the first eight months of 1902 is more than \$12,000 ahead of the corresponding months of 1901.

MARIPOSA COUNTY.

(Special Correspondence.)—The Whitlock district is having many of its mines placed beyond the prospecting stage by systematic development. The ores are free milling and high grade. At Ellingham's mill the owner is replacing wood with fuel oil, being the pioneer oil burner in this district; several other properties are only awaiting a successful trial before changing. The ore bins of the Austin mill are being filled, and the stamps will soon be dropping there. Work is being pushed ahead on the Hayseed mine. This property is showing up well; formation diabase and greenstone. A new steam hoist is installed and the shaft house improved. The incline shaft (45) is down 300 feet, and a rich pay shoot is being opened up on the third level. They are working three eight-hour shifts. Ore is free milling. At the Teabo mine they struck another rich shoot, and double shifts were put on. Work is progressing on the Helm, Regan and Golden Gate properties. A new impetus will be given to the camp when the electric power plant on the Merced river is completed, as with cheaper power the large low-grade bodies of the Whitlock, Bulldog, Geary and others will then be capable of being milled at a profit.

Whitlock, Sept. 8.

The Mary Harrison 40-stamp mill at Centerville has closed down after eight months continuously successful operation.

MONO COUNTY.

The Sweetwater mine, Silverado canyon, J. A. Brown general manager, A. Sayres superintendent, has finished a 10-stamp mill and 50-ton cyanide plant. A. K. Wilson has charge of the cyaniding.

NEVADA COUNTY.

The Home G. M. Co. has elected D. J. McFall superintendent. The 30-stamp mill is in constant operation.

At the Orleans is being driven an upraise to connect with the old Heuston workings, about 210 feet. Superintendent C. A. Brockington estimates it will be completed Nov. 1.

J. E. Carter has organized a company to operate the South Idaho and expects that next month machinery will be in place and work begun. Grass Valley men believe that the extension of the Eureka-Idaho-Maryland ledge is in that mine.

The Champion Mines Co. is incorporated at Grass Valley: M. Sondheimer, J. Fetz, J. Bernhard, E. Schuck, H. Heinsohn, J. Assion, San Francisco; A. Wilhelm, Alameda. The company owns the Champion mine and adjoining mining properties.

At Grass Valley the Brunswick, C. H. Mallon superintendent, employs twenty-seven men. The Union says sinking has been in progress for the last nine months; the shaft is now down 1250 feet. In the east drift, which is in 506 feet, there is a 3-foot ledge; the greater part of the ore is low grade. It is estimated that by driving this drift 125 feet farther the main vein will be encountered. The west drift has been run 425 feet, with satisfactory results.

At the Grass Valley Con. mine it is expected that the present mill will be enlarged from ten to twenty stamps, a slime plant put in, and the shaft enlarged to three compartments when sunk to a depth of 1000 feet. A 40 H. P. electric motor runs the mill, concentrators and rock breaker; a 96 H. P. motor supplies power for the compressor, hoist and pump. G. W. Root has twenty men on the payroll.

The stockholders of the Jenny Lind M. Co. have elected the following directors: C. Stocks, J. W. Brown, W. M. Treloar, E. K. Smart, J. E. Polingdestro, G. Mainhart.

The Union reports that the 20-stamp mill at the Allison Ranch mine will be ready about December 1. The main building is 80x46 feet, 56 feet high. On the west side is a 20-foot sulphurets room. Under the ore bin is a rock wall 50 feet long, 13 feet high and 4 feet thick at the base.

Men are at work on the old Merrimac mine, near Town Talk, rebuilding the old shaft and retimbering the property to the drain tunnel. J. T. Gribble, superintendent Merrimac, is in charge.

The Union says the Pennsylvania will soon be working as many men as when work was suspended two years ago by litigation. Twelve additional men are put on. Ore is being taken out of the 700 level. The shaft will be sunk to a depth of 900 feet.

ORANGE COUNTY.

J. A. Comer, manager Santa Ana Tin M. Co., Santa Ana mountains, tells the Los Angeles Mining Review that he has tin in just such a formation as exists in one of the producing tin mines of Cornwall, England. The area over which it extends is about one-half mile long and 300 feet wide.

PLACER COUNTY.

At the Tadpole Con. M. Co. they are developing near Secret House. The main tunnel to tap the ancient channel is in 260 feet; an upraise is being made to strike gravel. The body of quartz is now 70 feet in width and prospects in free gold.

PLUMAS COUNTY.

Quincy reports a \$1000 nugget of gold brought there from Johnsville by W. Pastetta, found below Jamison City.

At La Porte the Clay Bank is in 7000 feet; and is still running for the back channel.

West of Little Grass Valley there are several claims on Moore's creek being prospected with a show of becoming good paying claims when properly opened.

SAN DIEGO COUNTY.

There are fifteen men working in the High Peak and Helvetia mines, taking out daily fifteen tons of milling ore, which keeps the mill busy.

A body of high-grade ore is struck in the Eureka mine, one of the Noble group in Pine valley.

On the Honeycutt group of mines on the Vicetos, near Poway, a body of ore has been discovered which assays \$9 per ton.

SANTA BARBARA COUNTY.

The failure of a deep well at Summerland to penetrate a stratum of oil supposed to lie from 1500 to 2000 feet below the surface of the ocean has proved a disappointment to that oil town. The attempt to drill into this deep stratum was made by H. Muller, an oil operator; his well has been abandoned at a depth of over 1200 feet. A string of tools, some cable and a fishing machine are now at the bottom of the well and the casing has been perforated at one of the shallow oil strata where a flow of from seven to ten barrels per day is ordinarily obtained. The depth is considered phenomenal in consideration of the fact that the well was started with a casing only 7½ inches in diameter and ended with only a 4½ casing. Oil drillers predicted when the well was started that from 500 to 600 would be its limit. The breaking of a cable caused the destruction of the hole. It is stated that the casing is not half an inch out of plumb throughout its length. The indications at 1200 feet are said to have been favorable. Men watched the drilling carefully and the formation through which the drill ran is said to have been distinctly a deep oil formation. Others will doubtless be tempted by the showing in the Muller well to drill to a greater depth. This well was the first to be run into deep ground at Summerland and is the deepest well anywhere near the Summerland dip.

SHASTA COUNTY.

Superintendent T. H. Russell says on Oct. 1st 300 men will be employed on the plant of the McCloud River Electrical Power Co. on McCloud river.

H. H. Noble of the Southern California Power Co. says he will establish a plant on Pit river with a capacity of 500,000 H. P. for the transmission of power to San Francisco. Four thousand cubic feet of water a second is to be conveyed 28 miles, giving a fall of 1300 feet on the power-creating wheels. Noble says his company has money to put in a big plant.

Near Copper City the Arps group is to be taken by the Empress C. & S. Co., F. H. Hall assigning his option on the mining property to that company. The property was taken under bond by Mr. Mr. Hall December 10, 1901, for \$80,000. The terms of the option provided for a certain amount of development work, for the payment of \$40,000 before December 10, 1902, and for the payment of an equal sum before June 10, 1903. Mr. Hall has complied with the working requirements and now transfers his option to the Empress Co.

The Modoc Chief Quicksilver M. Co. are examining the Clover Creek quicksilver mine, the title to which is vested in the Clover Creek Cinnabar M. Co. Some samples of cinnabar have been exhibited in Redding. Should the report justify it, the property will be worked.

An electrical power plant is being built by the owners of the Gladstone mine on Crystal creek, 3 miles above Tower House.

SIERRA COUNTY.

San Francisco and Oakland men will open up the mine of W. H. Weldon, near Forest City. A double shift will be worked on the second tunnel during the winter to tap the ledge at the 400 level.

G. A. Reynolds of Alameda will open up the True Fissure mine, near Gold Lake. A tunnel will be run to tap the ledge.

The Bellevue tunnel has been run since July, 1901, and is now in 3200 feet; an 8x8 tunnel, all the way hard rock; 200 feet yet to strike bordings, started in Wallace creek; a straight level, working two machine drills, hauling cars with a mule; power from a steam boiler, blower, electric lights and telephone into the tunnel as they proceed. So far little water to

bother the workings. The buildings are from the old Thistle shaft, on top of the hill, where they worked for several years by hoisting the earth and pumping the water. It was rich, but water got the best of them, hence their new location of a drain tunnel. In a few months more they will be in gravel.

At the Wild Boar a tunnel has been in operation for many years. Starting in at Gibson creek for the back channel, last July they struck soft rock, then went into pipe clay and a stratum of blue sand. They are now in 3525 feet. This should open up the ridge between South Feather river and Slate creek from Pilot Peak to the Clay Bank at La Porte.

SISKIYOU COUNTY.

The Golden Seal M. Co., Tacoma, Wash., J. B. Champlain general manager, has bought the Golden Seal claim near Oro Fino from Pitz Bros. and proposes placing a complete milling plant. The dredger at Hawkinsville has resumed operations.

The Rusby mine, Deadwood, is employing fourteen men. New hoisting machinery is to be added soon with the intention of sinking deeper.

Manager McLane, the Schroder mine, is employing twenty-six men, the 10-stamp mill operating.

The McVey copper property, on Joe creek, a tributary of Elliott creek, is reported sold to Montana men. The copper deposit is lens-shaped, carrying sulphide ore.

The new 10-stamp mill on the Wabana mine, 1½ mile west of Henley, owned and operated by Bennett, Reynolds & Matern, is about finished. The commercial business is done at Hornbrook, their post-office. They have a telephone line to the mine.

The Yuba Journal learns that the mines recently bought by E. D. Baker from Whip & Lowd, between Cherry Creek and Greenhorn, have been sold to G. V. Gray of San Francisco, who has men at work.

TRINITY COUNTY.

The Fairview mine, 8 miles from Lewiston, was recently bought for \$60,000 by Allenberg, Fontana and Jos. Porter, who is manager of the property. Setting the machinery in the mill is in progress; the tramway, which will carry the ore from the mine down the mountain to the mill, will soon be built. The flume will carry sufficient water from Papoose creek to the mill to furnish power. Seventy men are on the payroll.

L. Flynn of Lewiston has a lease on the Chamberlain mine from the Adele M. Co., and will reopen the property.

The Free Press says the Morrison Gulch mine, the property of Hilton & Webb of San Francisco and Seattle, has started up with twenty men at work and twenty more wanted.

There are eleven quartz mills of from five to ten stamps each on Coffee creek and the Trinity river, seven of them now running.—On the Dorleska mine McElwain & Osborne are employing forty men. Strode Bros. have fifteen men at work. C. Ruggles is working his mine and keeping a 5-stamp mill on Scorpion creek going. The Cook & Weiser 10 stamp mill is running steadily. Machinery is in Redding for a 10-stamp mill to be put upon the Three Peaks mine under the management of J. J. Chambers.

TUOLUMNE COUNTY.

S. Sprout, representing Wilber & Co., San Francisco, was in Tuolumne this week, examining a power plant project for his company. The proposition is to take water out of the main Tuolumne river, and convey it 10 miles through ditch and flume to Jacksonville, where it would get a fall of 450 feet; estimated cost, \$350,000.

A placer mine is being operated by Hess & Valverde, half way between Carters and Sonora.

Near Carters, the Hunter mine is bonded to J. P. Sweeney of San Francisco.

The Victory mine, 3 miles north of Confidence, will resume work. A 20-stamp mill is to be erected at the river and the ore will be conveyed by means of tramways. G. H. Lightfoot of San Francisco, one of the owners of the mine, is making arrangements.

YUBA COUNTY.

The California State Board of Examiners have approved the plans and specifications for the first of the proposed Yuba river barriers and at once notified the California Debris Commission of its act. The specifications approved are the same as were recently returned from Washington bearing the approval of the Secretary of War. Owing to the fact that the State and Federal Governments share equally the cost of this great undertaking, representatives of each must pass upon all important particulars. The first barrier will cost \$35,000, the total sum appropriated being \$800,000.

P. D. Whitehead of Chicago, F. C. Butterfield of San Francisco and F. E. Wright of North San Juan, have secured twenty-

eight mines and mineral locations in Yuba county and organized the Pacific M. Co. The claims are in Bullards Bar and Fosters Bar districts.

COLORADO.

BOULDER COUNTY.

Near Rowena the Gold Nugget Co., after two trial runs of 100 tons each at its mill, pending a sale to a New York party, declared the sale off, and mine and mill are closed down. The property was offered at \$150,000, one-third cash, the remainder on time payments. The intending purchaser was gratified with the trial runs, but made a counter proposition to pay \$100,000 spot cash in full for the property, which the Colorado owner, a practical mining operator, refused.

Work has been resumed on the group of the Rosalind M. & M. Co., on Hematite mountain, near Eldora. A crosscut tunnel, now in 490 feet, cuts the Anything and Rosalind veins, showing 14 feet of ore. On the Rosalind vein the values average \$7 per ton, while on the Anything there is 2 feet averaging \$16 and about 6 inches that runs above \$40.

From the Enterprise mine, on the north slope of Spencer mountain, about 1000 feet above Eldora, come reports of an ore body blocked out and ready for shipment. J. Phillips, one of the owners of the property, operating it under a lease, is shipping, receiving returns of \$35 per ton. Quantities of low-grade ore have been left in the stopes, which cannot be profitably treated by the smelters, but which could be treated by the chlorination mill. The shaft is down 400 feet.

CLEAR CREEK COUNTY.

A strike is reported in the Centennial mine, Georgetown, of a 4½-foot vein of copper-gold concentrating ore in the 600-foot or bottom level, averaging \$100 per ton.

The Georgetown Courier reports the main Kelly tunnel advanced 210 feet last month; 250 feet will probably be made during the present month. For several weeks this main tunnel has been making 8 to 10 feet a day, and about 6 feet a day is the average in the Deming vein in either drifting or crosscutting, as air drills are likewise employed there. A horse has split the Deming vein at a point in about 75 feet from the tunnel, one branch of the vein continuing with a 2-foot streak of mineral. An interesting feature of the progress made last month in the Kelly tunnel was the payment of \$750 which Manager Kelly had promised the miners, trammers and powder men for the extra development they might accomplish beyond 170 feet a month. As a result, the trammers who worked most steadily averaged from \$93 to \$101 a month and drill men \$4 60 a day.

Georgetown reports notification from the smelting trust to local ore buyers of an increase of \$3 per ton in smelting charges or treatment on all ores of a gross value of \$18 or under. The extra charge will have the effect of shutting off the sale of this class of ore. Very little ore of this grade is produced in that district.

CUSTER COUNTY.

Near Isle, Spaulding & Mooney, in the Custer City lode have ore carrying lead 65%, copper 22%, gold \$11.20, and five ounces of silver, 2½ miles south of the Terrible mine.

FREMONT COUNTY.

The Colorado Fuel & Iron Co. has surveyors working between Florence and Beaver creek, surveying a line for a ditch to extend from the steel works to Canyon City, where it will tap the Arkansas river, to secure water to run the steel works. The ditch will be 40 feet wide and 40 miles long.

GILPIN COUNTY.

The Register-Call reports that the Waltham mine is daily shipping three cords or about twenty-five tons to the Golden smelter. Besides the milling product which they are shipping to the Golden smelter, they are also shipping smelting ores, the shipments for the past month being five cars, one lot going at \$57 per ton.

Sinking operations are being carried on in the Saratoga shaft, now to a depth of 950 feet. Air drills are being used in putting down the cage shaft, three shifts being used. About 100 men are at work. E. R. Nelson, superintendent.

The Druid G. M. Co., E. McGinnis, superintendent, are developing the group of claims owned by the company in Russell district.

During the last week of August the shipment of smelting and crude ores, concentrates and tailings from the Black Hawk depot to the Golden and Denver smelters, as well as to Idaho Springs, were 104 cars or 2080 tons, making a total for the month of August of 409 cars, or 8180 tons, the same number of cars as the preceding month of July.

Sixty stamps are dropping at the mill

of the Boston & Denver Consolidated Co. at Black Hawk on custom ores.

LAKE COUNTY.

Leadville's August tonnage averaged 2100 tons—63,000 tons for the month—as large as August, 1901, except 5000 tons of manganese, which was then moving to the Chicago Steel Works.

During August the A. M. W. M. Co. shipped 3000 tons of crude ore, 1500 tons of zinc concentrates and 370 tons of lead concentrates. The Midas shipped 6105 tons, the Castle View lessees 475 tons, while the new A. Y. & Minnie mill made 650 tons of zinc concentrates and 445 tons of lead. The attempt to handle the zinc ore of the A. Y. & Minnie was a new experiment.

The Yak tunnel has maintained the average of production—100 tons per day. The tunnel is going ahead at the rate of 6 feet per day and is now in hard quartzite.

L. Atkinson has charge of the construction of the Resurrection mill. Manager Carnahan, when the mill is completed, will be ready to take out 650 tons of ore per day.

The Bimetallic plant of the American Smelting & Refining Co. has been dismantled this summer. All machinery, lumber and brick that was of any value have been taken to the Arkansas Valley plant, and the flue dust, slag and other material that promised to yield any value have been shipped away. There is not a vestige left of the old American plant.

SAN JUAN COUNTY.

Silverton states that the new process for saving gold values from the tellurium ores of Bear Creek camp is a success. The plant is a small one—one ton in twenty-four hours. It is working in the ores of the Good Hope. C. H. Gage is the inventor.

SAN MIGUEL COUNTY.

At Telluride the mill at the Silver Bell mine is still idle. Manager Buckley expects to begin Oct. 1.

The twenty stamps in the mill of the San Miguel M. Co., which have been dropping on ore from the Nettle mine, were hung up last week.

Telluride reports that L. White, on the Blue Lake lode, Bridal Veil basin, has a streak of ore carrying values in gold and silver to the amount of \$800 a ton. The property is owned by White, Adams & Hiltenshouse of Telluride.

SUMMIT COUNTY.

The Montezuma district has increased its ore output. The Colorado & Southern has put men on the line between Dillon and Keystone, the Montezuma and Rathbone shipping point, and will put the roadbed in condition. If the Montezuma and Argentine districts continue to improve, it is expected that the Colorado & Southern will extend its line to Montezuma.

Near Breckenridge, the Hamilton and Minnie are to reopen. The Minnie mine, on Mineral hill, is being put in shape by Foote & Whyte for development work.

At the Cashier mine, in Brown's gulch, Manager Wood has considerable low-grade ore, and will put the Cashier mill in shape to work it.

TELLER COUNTY.

The Vindicator Co. has started its new pump in the bottom level to handle the flow of water, that operations may be carried on in that level without further interruption. The new pump has a capacity of 500 gallons a minute, and that, with the one already working, permits them to throw 800 gallons a minute.

W. G. Rice, former general manager Stratton's Cripple Creek M. & D. Co., has organized a leasing company to operate in Cripple Creek.

C. C. Hemming has a 60-day option on the Morning Star claim, at the price of \$50,000.

Eight feet of smelting ore has been found in the 300-foot level of the Thompson shaft of the Elkton, which from all appearances had been covered up and hid from sight. That fact has been established because there were piled up on the ore body close to 200 tons of low-grade ore, rotten timber and mine rubbish. The find was made by J. Wright, who recently secured a lease on the property.

Cripple Creek reports a strike on the Mary Cashen property, adjoining the Gold Coin in the city of Victor. In the 425-foot level, in the crosscut 40 feet south of the shaft, an ore body that has been drifted upon or a distance of 25 feet returns values of \$170 to the ton.

The War Eagle Leasing Co., operating the War Eagle claims on Bull hill, is drifting now from the bottom of the winze; everything in sight is ore, averaging \$30 to the ton.

The mining men of the district feel good over the cut in freight rates on mining machinery from Chicago, Milwaukee and St. Louis and Mississippi river points. The cut means a considerable saving to

the compaoles that have machinery ordered. Formerly the rate from Chicago points to Colorado Springs was \$1.10 per 100 pounds; the second cut puts it down to 27 cents per 100 pounds.

IDAHO.

ADA COUNTY.

P. A. H. Franklin has been sampling the Daisy group of gold mines, 4 miles from Boise, and it is said that about \$100,000 will be paid for the property.

BOISE COUNTY.

Near Idaho City, a station is cut on the 400-foot level of the Washington mine. The distance from the shaft to the shoot is 125 feet. It will be tapped next month.

Fifty tons of ore from the Clover Leaf mine, formerly the Mountain Ram, crushed in the Lucky Boy mill, gave \$12 a ton. The mill has no concentrator, so the value in the sulphurets was not saved. This ore was taken out the full width of the ledge—a little over 6 feet, and milled without assorting. The shoot is 100 feet long. The old machinery on the dredger above Centerville has been replaced with new and the dredger is now in operation.

CUSTER COUNTY.

Reported discoveries at Loon Creek, east of Thunder Mountain, attracts the attention of mining men of southern Idaho. Some of the rock brought is covered with flakes of gold. Eddy and Beane have discovered what is said to be the Lost Packer lode, 12 feet wide and an average of nearly \$50 per ton. The mineral belt is 4 miles wide. Men are going into the new district from Thunder Mountain, Salmon City and Custer.

ELMORE COUNTY.

The Idaho-Richmond G. M. Co. is organized to develop a free-milling property on Rocky Bar, Bear creek; W. H. Stowell, M. E. Gallimore, J. W. Higgins of Spokane. The property has several strikers varying from 4 to 8 inches wide and carrying values \$200 to the ton.

KOOTENAI COUNTY.

Manager A. Klockmann of the Idaho-Continental M. Co., operating the Continental, near Port Hill, says he will build a railway to the mine next spring. At the same time a 500-ton concentrator will be built at the point where the tram connects with the railway. He says it is too late to go ahead with the construction of the road this season, but will repair the present wagon road at an expense of \$5000 and ship ore during the winter. About twenty-five men will be employed. The ore is a galena, running about 60% in lead.

SHOSHONE COUNTY.

(Special Correspondence).—The Gold Creek Con. M. Co. of New Jersey at Orofino, Pierce City mining district, are the owners of the Mascot. At present they have a 10-stamp mill and engines, also boilers large enough for twenty stamps. They have fifteen more stamps ordered. A 100 H. P. boiler is being taken into the mine, also compressor and hoist. Nearly 6000 feet tunnel work has been done in the mine. E. E. Rodgers is manager. Pierce City, Sept. 8.

Near Delta, the dredger on Beaver creek of the Northern G. M. Co. is in operation, the first of its kind in the county. It is the starting of a new branch of mining in the Cœur d'Alene section. The dredger cost \$40,000, is 75 feet long 35 feet wide, draws 4 feet of water. Manager C. S. Cryslar says it will take eight men to run it. Another dredger is being built for the Delta G. M. Co., which owns about 150 acres of land on Beaver creek, near Delta. Machinery for a third dredger has been ordered by the Beaver Creek G. M. Co. The entire upper end of the creek has been located as placer ground.

Murray reports 4 feet steel galena on Alder gulch. W. Q. Brown, manager Cœur d'Alene M. Co., secured the location on which the strike was made; property for miles around is being staked.

At Burke, the Headlight M. Co., adjoining the Mammoth mine, will resume. The 900-foot tunnel will be driven 100 feet, at which point it is expected the Mammoth-Standard ore vein will be tapped.

At Wallace, W. T. Hales says he has raised money from Pittsburg and West Virginia to operate the placer properties at the head of St. Joe river and of Cedar creek, 20 miles south of Iron Mountain station, Montana. It will require \$450,000 to operate both properties successfully. The Cedar property, 4 miles from St. Joe hasin, has made the best showing because it has been developed more extensively than the others. The St. Joe property is 8 miles long and from 800 feet to half a mile wide. The Cedar creek property is nearly as large. Sixteen men are employed on the Cedar creek property and the work of mining is being done by two plants. A mile flume has already been constructed. The St. Joe will be provided

with a mile and a half flume. From the tests made the ground yields about 85 cents in gold to the yard. The paystreak runs in depth from 20 to 100 feet before bedrock is reached. The principal work to be done this fall is to prepare for operations in the spring.

WASHINGTON COUNTY.

Manager F. E. Pierce of the Iron Dyke mine, Seven Devils district, says he has twenty-five men at work. He has let a contract for 75,000 feet fir timber in preference to other timber. The tunnel is now in 1000 feet.

The Fort Salver mine on Black lake, Idaho, Seven Devils district, has been worked for three years and 3000 feet of development work done in tunnels. The ore vein is 8 feet wide—\$20 to the ton. There are twenty stamps to the mill and the management is adding twenty more.

MICHIGAN.

HOUGHTON COUNTY.

At Houghton the Baltic during August furnished 231 pieces of mass copper, filling fifty-eight barrels. The largest block of mass copper ever found on the Baltic property was hoisted to the surface recently from No. 4 shaft, weighing 2570 tons. The total production for the month of mass and mineral copper was 380 tons.

MONTANA.

FEROUS COUNTY.

At Yazo work has begun with a large force of men in the new shaft at the mines of the Sapphire M. Co.

H. Parrent has rich ore on his Rawley claim, Dog creek section of the North Moccasin country. Reports give the ore a value of 300 ounces in silver, 20% lead and some gold. The discovery of lead-silver ore beyond the cyanide belt is regarded by mining men in that section as significant.

FLATHEAD COUNTY.

It is reported in Cabinet that J. Fredericks has a pocket of free gold quartz on the Libby claim from which he has taken two flour sacks full of the quartz. The claim lies between the Blacktail M. Co.'s property and the group of claims owned by the West Fisher G. M. Co., and is supposed to be an extension of the Gold Bug vein, which is owned by the American Kootenai M. Co.

GRANITE COUNTY.

(Special Correspondence).—The Mountain G. M. Co., with headquarters in Butte, are the owners of five claims near Princeton. This company commenced operations last March, and have sunk a shaft 100 feet and driven a tunnel 450 feet. They are treating the ore in their 10-ton mill, and shipping the high-grade ore to the smelter at Butte. The ore runs from \$10 to \$340 per ton. It is free-milling gold ore. They have a boiler capacity of 100 H. P. and employ twenty men. The property adjoins the Royal Gold mine, which has produced in the past about \$3,000,000. They intend increasing the capacity of the mill to fifty tons per day. The pay streak is from 6 inches to 3 feet wide. The country rock is granite. C. F. Chapin is the manager. Princeton, Sept. 5.

The Bear Mountain P. M. Co., J. D. Murphy, general manager, will work the Pine Ridge placer deposits, Cayuse gulch, 2 miles east of Garnet, where a deposit fills the basin at the head of the gulch and the ground slopes toward the gulch, the descent being sufficient to give the water used in flume or sluice boxes the proper fall. The deposit is composed principally of clay and gravel, stained by red oxide of iron, the whole resting on a bed of slate, free from large boulders. The property is developed by two bedrock drifts, one 1000 feet long, the other 600 feet.

The Pine Ridge claim comprises twenty acres of ground; the deposit has an average depth of 25 feet. Estimated cost, 3 to 5 cents to work the ground by the sluice-box and hydraulic method.

LEWIS AND CLARKE COUNTY.

The option for a bond held by the Montana M. Co. on the Strawberry and Mammoth claims on Skelly gulch has been taken up and the final papers executed. The properties are 16 miles from Helena. Five thousand dollars of gold ore has been shipped from the Strawberry shaft. The bond is for \$60,000, with provisions for the payment of royalties on ores milled or shipped.

W. Y. Simonton and associates are prospecting what may prove to be a body of gold ore amenable to the cyanide process. Nine claims have been located on the high benches and gulches on the north side of the Missouri river, above the mouth of Prickly Pear creek, 15 miles northeast of Helena.

MADISON COUNTY.

(Special Correspondence).—The Noble mine, 8 miles east of Sheridan, was started thirty-three years ago. It is ship-

ping ore that will run \$50 to the ton. They are driving an upraise for the old shaft. The shaft is 240 feet deep. The tunnel is 2090 feet long. The upraise is 700 feet long. R. W. Noble, Whitehall, is superintendent.

Whitehall, Sept. 8.

(Special Correspondence).—The Mountain View group of mines, owned by Johnson Bros. of Butte, is composed of five claims in Bear gulch, Tidal Wave district. They have sunk a shaft 260 feet on the vein and are running a crosscut tunnel and are in about 1100 feet and expect to cut the vein 150 feet farther in, which will give them a depth of about 900 feet on the vein. It is a sulphide copper ore, carrying gold and silver. The mine is 4 miles from the railroad at Iron Rod, on the Jefferson branch of the Northern Pacific. On the tunnel they have a boiler and compressor operating an air drill. They employ eleven men and are drilling about 8 feet per day. The ore averages about 12% copper, \$2 to \$3 in gold and a few ounces in silver. E. C. Baxter is the manager. Bear Gulch, Sept. 8.

(Special Correspondence).—The Bismark-Nugget Gulch Con. M. Co. of Sheridan are the owners of several claims in Nugget gulch, on Mill creek. The most important of these are the Diamond, Toledo No. 1 and No. 2, Diadem and Mountain Boy. This company has a 60-ton concentrator and 30-ton blast furnace smelter. In the claims mentioned they have galena and bodies of low-grade concentrating ore. The mine is $\frac{1}{2}$ mile from the concentrator. The Toledo shaft is down 300 feet and a crosscut run towards the Diadem 480 feet, and expect to tap the Diadem vein from the Toledo tunnel. This company expect to double the capacity of their mill and make many other improvements. A. B. Knight has charge of the work for the company. E. King has charge of the mine and F. B. Linderman the laboratory department.

The Iroquois M. & M. Co. of Sheridan have opened up some large bodies of fair grade ore. They have a small cyanide plant and stamp mill. O. F. Wright is manager. Sheridan, Sept. 8.

(Special Correspondence).—The General Shafter mine at Virginia City are operating a cyanide mill successfully on a fair grade ore. They have recently made a good strike in their property. The mine is under the management of Thomas Teal.

The Quincy mine at Twin Bridges, owned by Moffat Bros., Mason & Fox Bros., have crosscut an 80-foot copper ledge carrying good values in copper, 18 feet of which will run about 19%. The lead carries copper, gold and silver. Virginia City, Sept. 7.

Teal & Ribble of the General Shafter mine at Summit have a lease on the Fairview lode, near Pony. The Shafter mill will be run on ore from the Fairview. The miners at the Shafter will push development work on the Shafter and Keystone.

SILVER BOW COUNTY.

The Alice hoist will be rebuilt. General Manager W. T. Buzzo says it will be finished within forty days. An engine large enough to continue the work of hoisting will be put in and operations go on as before.

NEVADA.

HUMBOLDT COUNTY.

The Lovelock Tribune says that men employed in the sulphur mines near Black Rock are invariably healthy and those who go there with blood and skin diseases are speedily cured by the contact with the sulphur.

LINCOLN COUNTY.

The railroad of the Quartette M. Co., Searchlight, from the mine to the mill on to the Colorado river, is 16 miles long; to the mill the elevation is 3000 feet below the terminus at the mine; maximum grade 5.8%. The loaded train runs down by gravity and the climb is maintained with empty cars. Each returning train takes up a flat car of water barrels, which return empty by gravity. Oil is used for fuel on the engine.

The Tribune reports McNamee, Linney and Keets organizing the Cold Turkey M. Co., to work seven locations 5 miles north of DeLamar.

NYE COUNTY.

The strike of a ledge in the shaft of the Mizpah Extension Co. at a depth of 430 feet has encouraged the company in its work, as it is locally considered to prove that the ledges exposed on the Mizpah ground extend under Mount Oddie. The same blue lode porphyry that is encountered on the west side of the mountain are assumed to exist on the east field, when depth is attained, to prove as rich as any that has been opened up.

Near Austin, J. Casserly has sold the Yankee Blade mine to T. L. Oddie of Tonopah. The ore is ruby silver and in the bottom of the incline a body of ore is

exposed, but it will remain there until pumping machinery is installed.

At Toopah, the new shaft being sunk on the east extension of the Mizpah has lode porphyry in the bottom at a depth of 200 feet.

In San Francisco on the 6th the Butte-Tonopah M. Co. was organized. Directors: Lee Mantle, Butte, Mont.; J. L. Merrill, San Francisco; T. L. Oddie, general manager Tonopah M. Co.; R. Dougherty of Tonopah, superintendent of Lease No. 2 on the Mizpah vein; D. J. McDonald, Rossland, R. C.; F. O. Chamberlain, Bakersfield, Cal., and J. Gerber, Lincoln, Colo.; W. C. Beattie is secretary.

Another strike is reported in Tonopah, the shaft in the Ohio Extension in ore at a depth of 300 feet, averaging \$160 a ton, an extension of the Mizpah formation. The strike is half a mile from the last proven ground.

NEW MEXICO.

GRANT COUNTY.

Silver City reports a miolog sale in Burro Mountain miolog district—the Comacho group—to J. S. Curry for \$105,000. The new owner intends to put a leaching plant on the property; capacity, 200 tons daily.

Half of the force of workmen for the Colorado Fuel & Iron Co., at Fierro, has been laid off for an indefinite period and the output of iron ore materially decreased.

LINCOLN COUNTY.

Preparations are being made by the Rincon M. & M. Co. to begin active operation in the Jicarillas.

SOCORRO COUNTY.

Machinery for a 30-ton concentrator has been ordered for the Cooney mining district, as an addition to the Silver Bar mill, capable of treating fifty tons of ore per day.

OREGON.

BAKER COUNTY.

Development work has begun on the Oregon Chief, the property of the Oregon Chief G. M. Co., Cable Cove district, Pollman, Lack & Donnelly. There are 1300 feet of tunnels and shafts. It is the plan of the company to sink a shaft on the pay shoot, a mill, hoist, pump, etc., to be erected on the property at once.

W. H. Gleason has a prospect 1 mile from the North Pole mine, in the Cracker Creek district, which he has located as the Buckeye group. It is only a prospect, but the surface indications show a lead 40 inches wide, assays \$58 per ton.

GRANT COUNTY.

The Hoosier Boy mine, 4 miles from Canyon City, has a 25-stamp mill in operation. The mine employs thirty-five men.

The Great Northern mine is $2\frac{1}{2}$ miles from Canyon City. It has a 2-stamp mill of the Tremaine pattern, operated directly by steam power.

JOSEPHINE COUNTY.

At the mines of the Waldo Smelting & Mining Co. a new town has sprung up called Taklima.

MARION COUNTY.

At Salem, the Universal G. M. E. Co. is organized. It is the purpose of the company to "purchase the tailings of a large mine in California" for about \$8000, and employ a secret process W. L. Long claims to have discovered for extracting gold from the tailings of a mine. About \$5000 will be expended in the purchase of an air-compressing machine.

SOUTH DAKOTA.

LAWRENCE COUNTY.

D. N. Heizer of the Spearfish G. M. Co., owning several hundred acres mining land in Ragged Top mining district, says that with the second gold brick turned out by their mill in August the company was put out of debt. The brick ran about \$11,000 and represented a fifteen-ton run. The output of the mine for August was \$22,000 net to the company. The Spearfish suffered the loss of its entire surface plant by fire last January, so that the operations of the company were interfered with. The new mill was constructed at a cost of \$75,000, and is now in running order, equipped to handle 300 tons a day. The present output treated is about 5000 tons a month.

The Dakota M. Co. is shipping its ores 40 miles and reducing them at a cyanide plant in Deadwood which has a capacity of 100 tons daily. The total cost of mining, shipping and treating is \$2.83 per ton. Of this, 75 cents per ton goes for hauling, leaving \$2.08 for mining and milling. The ore will average about \$8 per ton, and the average extraction at the mill is 84%. The ore lies practically on the surface and is taken out of open pits at small expense. The company is preparing to enlarge the mill to 200 tons capacity.

The Homestake mine yields 3000 tons of ore daily, which is worked through a 900-stamp mill. The ore is not free milling,

carries a good deal of iron and has to be amalgamated before cyaniding. The company has a 1000-ton cyanide mill in which the siliceous ore is worked. There are no sulphides in the district and some of the companies have to depend upon Montana for their sulphides to mix as a flux with their own ores. For a number of years the copper ore of the Speculator mine in Butte was shipped to Deadwood. The Ellison hoisting plant has a sinking capacity of 2000 feet through a four-compartment shaft. The deepest mine in the section is 1100 feet. The veins, as a rule, widen with depth. In the Highland mine, one of the Homestake properties, the vein was only of knife-blade thickness at the surface, and now at a depth of 800 feet it is 525 feet wide. The company employs, all told, about 1500 men. The Golden Reward mine has 2500 acres of patented mining ground and employs from 500 to 600 men. It has a smelting plant at Deadwood for the handling of the iron ore and another smelter for the treatment of the oxidized siliceous ores. The Horseshoe Co. owns a large number of claims, and has put in a new smelter of 300 tons capacity. It also operates a 1000-ton cyanide mill; daily output, 1000 tons ore. Near Lead, the Columbus G. M. Co. has two cars of machinery. Enlarging the Columbus shaft from two to three compartments is nearly completed.

The Pluma compartment shaft is down 300 feet. Superintendent Fillion will put in a 6-drill compressor.

E. Wade is sinking a two-compartment shaft on the ground of the Globe Gold G. M. Co., southwest of the Hidden Fortune territory of the Fort Pierre Railway, and will put in a hoisting engine of 1200 feet capacity, boilers, air compressor, machine drills, pumps, etc.

The Horseshoe Co. will build the stamp, wet-crushing cyanide mill at the mines near the Mogul shaft, 1 mile south of Terry. The ore will be transported to the mill by aerial cable tramways.

At Deadwood the Sun Dance shaft of the Golden Reward M. Co., Ruby basin, is on fire. Twelve mules are burned; all the miners are out and no lives lost. Attempts are being made to suppress the fire by sealing the entrances and shutting off the circulation of air.

The ore shoot of the Otto Grantz mine, now owned by the Hidden Fortune G. M. Co., has been reopened. Men have been engaged for some time stripping the surface, preparatory to milling the ore, and have been engaged putting drill holes down over an area of several acres. The drillings have been assaying from \$4 to \$40. Last week the miners struck the continuation of the shoot of ore that O. Grantz discovered three years ago, and from the drillings from three holes put down the assays gave returns of \$1400, \$1900 and \$1500, respectively.

The Columbus Con. Co. have received two carloads of machinery. The compressor plant is being placed on the foundations. The Columbus Co. controls 645 acres of ground containing extensions of the Homestake and Hidden Fortune mines on the north. M. Thompson is manager.

A large force is employed at the property of the Grantz G. M. Co., under the management of O. P. H. Grantz. The company owns 300 acres of ground.

The Review says the Golden Reward Con. M. & M. Co. has the only smelter in operation in the northern Black Hills at present. The National Smelting Co. built a 300-ton plant at Rapid City and is about to sell to the Horseshoe M. Co. The Golden Reward smelter at Deadwood was built by the Deadwood-Delaware Smelting Co. and sold to the Golden Reward four years ago. It has a capacity of about 400 tons of ore a day, and is operated largely on the siliceous ores from the Golden Reward Co.'s Bald Mountain and Ruby Basin mines, although it treats a large quantity of custom ore. The National Smelting Co. built its plant at Rapid City chiefly for the custom ores of the Black Hills, but was unable to keep it supplied.

PENNINGTON COUNTY.

The National Smelting Co. of Rapid City has closed the deal which makes the smelter at that place the property of the Horseshoe M. Co. The smelter is expected to start up Oct. 1.

UTAH.

The gold output of Utah is as follows, from a report by B. H. Tatem, who says: "The gold, silver, copper and lead of Utah were valued at \$27,091,709 in 1901, the greatest in the history of the State, and a gain of more than \$4,000,000 over 1900, which had previously shown the greatest yield. In recent years no gold has been taken from Utah placers. The decrease in the gold output was general throughout all branches of mining. The mining of silver in Utah is done largely in connection with mines carrying lead and other metals. The mining of such ores was curtailed by the decline in the

price of silver that occurred in 1901. Two-thirds of the entire silver yield of the state originated in ores carrying lead, thus giving importance to this class of mining far greater than attaches to the others."

The production of gold and silver in Utah by counties for 1901:

Counties.	Gold.	Silver.
Beaver.....	\$ 20,748	\$ 552,574
Juab.....	830,159	3,472,465
Plute.....	372,252	62,336
Salt Lake.....	576,983	914,029
Summit.....	283,852	9,128,887
Tooele.....	1,673,979	395,579
Utah.....	2,480	827
Wasatch.....	7,022	8,149
Unclassified.....	52,735	100,929

IRON COUNTY.

On Iron mountain within a year the first furnace will be in operation. The new company has offices in Cedar City.

The Oregon Short Line will construct a branch railway from the main line at Lund to Desert Mound. Owners of the group of claims will produce 300 tons of iron fluxes daily for use at the furnaces of the A. S. & R. Co. The Tribune says for some time the smelting company has been drawing on the mines of Leadville for 100 tons daily of argentiferous manganese, but the haul is long and expensive and the local article will, at the completion of the railway branch, have the preference.

JUAB COUNTY.

Judge Marshall of the Federal Court has rendered a decision in the Mammoth-Grand Central case, Eureka, that permits the Grand Central M. Co. access to the ore body from which for three years it has been excluded, and which practically settles the litigation between the two companies. Men were immediately put to work in the disputed territory.

At the Lower Mammoth that camp assays on the new ore body in the west drift show from eighty to ninety ounces silver per ton.

Superintendent Ball, Lower Mammoth, Tintic, in the west vein on the 600-foot level, has ore which shows 100 ounces silver.

The ore shipments from the Tintic district for August amounted to 273 carloads. Following is the output for the month:

	Cars.
Gemini.....	26
Bullion-Beck.....	28
Eagle & Blue Bell.....	10
Uncle Sam.....	12
Yankee Con.....	24
Eureka Hill.....	7
May Day.....	1
Carissa.....	25
Victor.....	2
Ajax.....	4
Grand Central.....	32
Mammoth.....	34
Lower Mammoth.....	5
Star Con.....	8
Sioux-Utah lease.....	1
South Swansea.....	17
Martha Washington.....	2
Dragon iron mine.....	34
Alaska.....	1
Total.....	273

Concentrates—	
Mammoth mill.....	6
May Day jigs.....	5
Total.....	11

PLUTE COUNTY.

At the Annie Laurie on Gold mountain the enlarged mill is treating 300 tons every nineteen hours.

The Snow Bird M. Co. has incorporated at Marysville to develop the Mountain Queen, the Mountain Queen No. 2 and the North Fork lodes, Ohio mining district. A. H. Franklin, B. Reynolds, J. M. Hansen, secretary, J. L. Leilich, E. E. Mork.

SALT LAKE COUNTY.

Superintendent Nutting of the Bingham Con. smelter, during August produced nearly 800,000 pounds of bullion. This month the fourth furnace will be put in commission as soon as the enlargement of the converter annex is completed.

Manager Farnsworth expects to utilize the 35% zinc ore in the Horn Silver mine, and has forwarded a 500-ton consignment to the reduction companies at Iola, Kan. Two years ago a 500-ton lot of the ore was brought from the mine to be sampled and sent abroad to learn what kind of treatment it required. Negotiations were broken off and the ore unloaded in the sampler yards. Recently the demand for zinc has increased, and several of the eastern companies want to know if the ore could not be handled profitably.

At Bingham, the Dalton & Lark tunnel, belonging to the Bingham Con. Co., drains the workings of the property at a depth of nearly 2000 feet. Various veins carry values of 20%.

At some of the Bingham properties the

contract system, as employed in Rossland, B. C., and elsewhere in ore extraction and development work, has made its appearance among the metal-bearing mines of the State at the properties of the Bingham C. & G. M. Co., inaugurated by Manager McVichie. Last month Manager Channing put it on trial at the Highland Boy. The Tribune says under the system the wages of those who have taken to it—186 at the Highland Boy—now ranges from \$3 to \$3.75 daily. Under the former system the same men averaged about \$2.75 a day. The system consists of running a drift, sinking a winze or making an upraise at so much per foot, while those employed in the stoping of ore are paid so much per ton for the volume extracted. Manager Holden of the U. S. M. Co. says the system will be introduced at his company's Bingham properties. It is simply "piece work" applied to mining as with machinists, compositors and other skilled intelligent men.

The fourth furnace, A. S. & R. Co.'s plant at Murray, is in operation.

The U. S. Co.'s plant will start this month.

Last week Bingham Con.'s furnaces turned out 186,243 pounds of copper, gold and silver-bearing bullion, which was forwarded to the Eastern refinery. The Highland Boy sent nearly 300,000 pounds.

At the various plants are employed about 1200 persons.

SUMMIT COUNTY.

The Tribune says that the Silver Key and Keystone groups, at Park City, have been acquired by D. H. Peery with local and Eastern associates.

WASHINGTON.

The output of metals in Washington for the calendar year 1901 was:

	Value.
Gold, ounces.....	31,987 \$661,239
Silver, ounces.....	337,381 487,927
Copper, pounds.....	23,529 4,757
Lead, pounds.....	216,841 9,396
Total.....	\$1,163,320

FERRY COUNTY.

Grand Forks, B. C., reports 250 tons ore from the mines at Republic delivered by the Kettle Valley Lines at the Granby smelter: San Poil, 100 tons; North San Poil, 100 tons; Princess Maud, 50 tons. The smelters at Greenwood and Boundary Falls have agreed to take a maximum of 125 tons of Republic ore daily. The Kettle Valley Lines and the C. P. R. will quote the same freight and treatment rate, \$6.50 per ton for Republic ore delivered to the smelters at Greenwood and Boundary Falls.

PIERCE COUNTY.

The Tacoma Smelting Co., owned by D. O. Mills and associates, has started its copper reduction works. After being crushed the ore is mixed with coke to produce a matte of 40% copper, going thence to the smelter, where pyritic furnaces are used.

OKANOGAN COUNTY.

At Chesaw W. T. Mendenhall has bonded the Grant group of claims on Copper mountain for \$40,000, in payments lasting a year. He has men at work.

S. S. Calahan has charge of the work on the Rainbow mine.

Superintendent E. P. Gallac of the Beaver Lake mine says that he is negotiating with the railroads for hauling the ore from the mine to the smelter.

Work has begun on the Old Germany mine. There is 300 feet of tunnel on the property. The work will be under the supervision of C. Davidson.

SNOHOMISH COUNTY.

The men at the Monte Cristo smelter demand \$4 for twelve hours' work, or \$3.50 for ten hours, instead of \$3.50 for twelve hours, which they now receive. The company is hiring men from Idaho.

WYOMING.

CARBON COUNTY.

Cheyenne reports that for the sale of the Ferris-Haggerty mine to the North American Copper Co. W. G. Emerson and J. S. Cary received a commission of 10% of the purchase price, or \$100,000, to be divided between them and several others who assisted.

FREMONT COUNTY.

A plant of steam machinery has been installed on the property of the Tully Copper M. Co. at Pearl. It is the intention to sink 500 feet and cut a station every 100 feet.

A strike of galena ore has been made in the Sierra Madre property near Pearl. The shaft will be continued on an incline to follow the ore which is dipping to the south. Assay: gold, .20 ounce, value, \$4.13; silver 17 ounces, value, \$9.01; lead, 3.50 ounces, value, \$2.45; copper, 72%, value, \$1.65.

FOREIGN.

BRITISH COLUMBIA.

The Mines Exchange of Nelson reports a ledge of galena and grey copper averaging from 10 inches to 3 feet in width, 90 miles north of Grand Forks. Specimens assay fifty-five ounces silver and 10% copper per ton respectively.

In Nelson district a 5-stamp mill is now on the ground at the Referendum, Ymir. Extra men have been employed at the Poorman-Granite and Molly Gibson, which are both looking well.

Kaslo and Slocan silver-lead shipments continue to improve. Profits are, as a rule, small. A number of the mines are only making working expenses; in general only the richer properties are producing largely.

H. Z. Brock, manager Camhorne group, owned by the Northwestern Development Syndicate, is superintending the erection of a 10-stamp mill and 5000 feet aerial tramway.

Ymir sends the report of E. Hooper on the Ymir mine. He agrees with Mr. Fowler, the company's engineer, in his estimate of ore in sight, which he figures at 106,000 tons, with a gross value of \$7.50 a ton, or \$800,000—enough to supply fifty stamps for 2½ years, or the full complement of eighty for a year and a half, independent of ore which will be opened up by future developments.

"The presence of bunches or seams of zincblende, galena or iron pyrites in the quartz has hitherto been regarded as the chief indication of the presence of sufficient gold and silver in the ore to render it payable. That the occurrence of these minerals in the ore is no criterion as to the accompanying precious metals, is sufficiently borne out by the recent developments in No. 10 level, where the quartz carries about the same quantity of the sulphurets as near the surface, but very little gold or silver. However, at the present east face of No. 10 level the ore shows an increased quantity of sulphurets, and a selected sample here taken gave a value of \$7.51, which is a higher result than any hitherto obtained. The ore is chiefly composed of quartz, with which is associated about 8% to 10% of sulphurets of lead, iron and zinc. The gold evidently occurs for the most part in a free state, over 60% being saved by amalgamation in the stamp mill and about 15% by concentration over the vanners, the average value of the gold left in the tailings being about \$1.75 per ton of ore treated. The concentrates shipped to the smelters from the commencement of operations by the company to Dec. 31, 1901, contained the average of 1.01 ounce of gold and 12.22 ounces of silver per ton and over 20% of lead. The efforts of the management are directed toward keeping the zinc contents of the concentrates down to about 10%, since a penalty of 50 cents is imposed by the smelters for each unit over 10%. Cyanide operations commenced in March last, and up to June 30 11,127 tons of tailings had been treated. According to the assays of the tailings and residues, about 835 ounces of gold and 3116 ounces of silver have been saved theoretically, although the actual results, which are not yet obtainable, will undoubtedly be considerably less. The operation of cyaniding has naturally been attended at the outset with many minor difficulties, and the average cost per ton of the tailings treated, viz., 63 cents, is high, and should still be reduced. The total gross product and value of same to June 30, 1902, has fallen from \$11.94 in 1899 to \$6.84 per ton during 1902. This decrease in values was rendered more apparent than real by the extraction and shipment to smelters during 1899 of a considerable quantity of rich carbonates and crude ores. At the same time it can not be denied that a lower grade of ore is being worked than hitherto. With the observance of greater care in mining, much of the poor and sterile rock in the ore could be prevented from being sent to the mill, as at present, and so maintain an average value of at least \$7.50 per ton in the ore milled."

Next to the Rambler, the Payne mine has the largest payroll in Sandon. There are seventy men working, and twenty-five more employed in and about the mill and lower terminal. Power and light for the mine and camp are generated at the mill. The shipments last month were 250 tons. The Rossland Miner produces a statement of the ore shipped and the average assays values contained therein from the Le Roi mine in the past eight months:

Month.	Tonnage.	Assay Value Per Ton.
December, 1901.....	16,556	\$11 40
January, 1902.....	19,640	10 74
February, 1902.....	18,794	10 72
March, 1902.....	24,528	9 92
April, 1902.....	25,593	10 25
May, 1902.....	13,047	15 86
June, 1902.....	11,475	17 70
July, 1902.....	14,492	17 67

These figures are reproduced by the Miner in refutation of the statement from

the late metallurgist at the Le Roi smelter at Northport, to the effect that the profits the Le Roi Co. has made during recent months were not produced as a result of the shipment of a better grade of ore from the mine, but from economies which he had succeeded in effecting at the plant.

H. N. Allen, superintendent American Boy, Sandon, has banded the Planet and Comet and begun active development.

Operations are to be renewed on B. C. mine at Eholt. The mine is owned by the B. C. Chartered Co. of Montreal. It was worked with very little intermission from the summer of 1897 until January, 1902; owing partly to the low price of copper, it was closed down. During 1900, which was the first year ore was sent to the smelters in quantity from the Boundary mines, the B. C. shipped about 19,500 tons of ore to the smelter. The output for 1901 was 48,000 tons; the small shipments during the current year bring the gross output of the mine to about 70,000 tons, giving an average assay of 0.015 ounce gold, 2.45 ounces silver and 5.8% copper (wet assay) per ton. About four-tenths of this ore went to the Trail smelter and the remainder to the British Columbia Copper Co.'s smelter at Greenwood. The ore is chalcopyrite, pyrrhotite and some pyrite, with small quantities of gold and silver. About 7000 lineal feet of work in all has been done in underground development.

The Velvet mine, Rossland, has resumed shipments. This time the ore is being sent to the Northport smelter. The ore has been high-grade picked material. The low-grade ore is being reserved for treatment in the concentrating plant now in course of construction. The system to be utilized in the plant is a water process. The last shipments from the Velvet were sent to the Hall smelter at Nelson, but the copper furnaces at the Nelson plant have been shut down since the last ore from the Silver King mine was treated, hence the change of destination to Northport, Wash.

T. G. Blackstock of the War Eagle and Center Star mines, Rossland, B. C., says: "It has been apparent to us that the charges of mining and development in Rossland on the one hand, and of freight and treatment of ores on the other, were such as to preclude the possibility of these mines paying the dividends that were expected. The reason for this was that the high-grade ore bodies were segregated, and a great deal of dead work had to be done to reach them, often through ore of too low a grade to stand these charges. It appeared to us, therefore, imperatively necessary to obtain, first, a substantial reduction in the cost of mining, freight and treatment, and, second, to discover some means of handling these low-grade ores at some profit. Since dividends were last paid we have succeeded in reducing the cost of mining development very materially—in fact, from about \$4 a ton to \$2.10 a ton, or cutting it almost in half. This has been done chiefly by introducing a modified form of contract system. It was only lately, however, that the smelter people saw their way to make such a reduction in the freight and treatment charges as would justify us in commencing shipping on a large scale. Meanwhile during the past three years development work has been pushed, and even while not shipping we have had at least 225 men employed constantly in the two mines. The whole cost of freight and treatment has been reduced from \$6 to \$5 a ton on ores containing values to the amount of \$9.50, while on ores under this grade the charges have been reduced from \$6 to \$4. During this time, also, attention was paid to the problem of treating the low-grade ores by some process other than smelting. As the result of our experiments we have secured a mill at Silica, on Sheep creek, a few miles from Rossland, which we have reconstructed and enlarged to a capacity of about 100 tons a day. It is not intended to use this mill for anything except experimental purposes, as a guide to us in erecting a larger mill, of a capacity of 500 tons or more per day, which mill we propose to erect next spring. I think that I can safely say that \$5 ore may be treated by milling at a profit. For reasons well known to mining men, high-grade ores can generally be more cheaply treated by smelting. I am satisfied that in a few years we shall be able to treat \$4 ore at a profit. Under our new contract the two mines are to deliver 12,000 tons a month of high-grade ore, and as much more under the \$9.50 limit as they choose, which will probably be from 6000 to 12,000 tons a month more. We have not shipped in any quantity since the strike of a year ago last July, but have simply been making shipments from time to time of ore encountered in development, and also shipments to test certain ore bodies. I would like to emphasize the fact, however, that we have never ceased operations, whether we shipped or not. At the time of the strike 500 men walked out, but since then we have had 225 men working on devel-

opment work continually. I expect in a few weeks we will have fully 500 men employed again."

Directors of the Snowshoe Gold & Copper Mines, Ltd., owning the Snowshoe mines near Phoenix, are at Grand Forks looking for a smelter site. They say: "Our mines are now developed to the stage when they can produce a daily tonnage of 600 tons, a figure that can soon be very largely increased. Our idea is to erect a 1000-ton plant."

CANADA.

The report of the Ontario Bureau of Mines shows that in 1901 that province produced minerals to the value of \$11,831,086, of which \$5,016,734, or 42%, represented the metallic output. The nickel output is represented by 441 tons, valued at \$1,859,970, which is an increase of 145% in value and 25% in quantity over the year 1900. The quarterly statement of the bureau also shows that the value of the nickel output this year is \$354,498 in excess of the corresponding period of 1901. The copper product of 1901 amounted to \$589,080; the value of the output for the first quarter of 1902 over that of 1901 amounts to \$121,545. The wages of the 2284 men employed in the nickel-copper industry for the year amounted to \$1,045,889.

MEXICO.

Monterey reports the sale of Bolonitos mine in Guanajuato for \$250,000. The purchasers are Boston men principally. Some of the men in the deal are E. L. White, D. McViehe, A. W. Hale and J. A. Coram. The Bolonitos is an old mine and has a record of \$7,000,000 production; \$50,000 cash has been paid, the balance within twelve months, when the transfer will be completed. The mill at the Cochiti, New Mexico, may be used.

OAXACA.

The Sierra Juarez M. and D. Co., with a capital of \$2,000,000, is organized in Colorado Springs to operate mines in Oaxaca.

SONORA.

The American-Mexican Copper Co. is formed at San Diego, Cal. C. E. Warfield is president. Another new company organized at the same place is the Gold Galore M. Co. W. R. Andrews is president. Both companies have acquired properties in the Magdalena district of Sonora.

W. T. Meade of San Francisco and W. Short of Caballona, Sonora, have mining property 15 miles south of Douglas, a ledge of copper-bearing ore. There are two shafts on the property, one about 80 feet and the other 125 feet in depth. A San Francisco company has been formed to work the property on an extensive scale. Hoisting works and a pump will be placed on the property.

At Monterey, the Arizona-Mexico Copper Co. has incorporated under both American and Mexican laws, to exploit Gran Province Dora de Cobre mine, consisting of twenty pertenencias, at Co-boetia.

Campo Santo Ninyo, where the Yaqui Copper Co. is operating, reports six shafts now sinking and eleven tunnels running, all in ore.

The Tubutama M. Co. are developing their property near Penyasco Quemado, Altar.

C. Hayes has organized the Hayes M. & M. Co. The company will erect a 10-stamp mill at the Pineta mountains, southwest of La Cananea.

NEW CALEDONIA.

G. M. Colvocoresses, commercial agent at Noumea, reports the formation of an American company with mining interests on that island. The mines of New Caledonia have for some time exported considerable quantities of nickel and chrome to the United States, and these exports are certain to increase. The International Nickel Co., the new concern, is composed entirely of Americans, and in connection with Le Nickel Co. of Paris, may control the nickel production of the world. The properties of this company embrace much fine mining land in New Caledonia. The feeling on the island is cordial to American enterprise, and should the Oceanic line make its proposed change of route, stopping at Noumea, one may expect to see this colony dealing almost completely with commercial houses in the United States. There will then be an excellent chance for firms upon the Pacific coast to do direct business with Noumea, as merchants there realize that they can buy supplies more advantageously in our country than in Australia or Europe, provided proper transportation facilities are afforded.

SOUTH AFRICA.

Johannesburg in July produced 149,179 ounces fine gold, an increase of 6399 ounces over June. For the calendar year from Jan. 1 to July 31 the total output is 806,021 ounces fine gold, \$16,660,454. There

is a new departure in the manner of calculation, all returns from the Transvaal now being made in fine gold.

SOUTH AMERICA.

J. W. Mercer has returned to Colorado after a stay of two years in Ecuador. The property where he has been manager is owned by the South American Development Co. of New York. The property is in the Andes, 60 miles southeast of Guayaquil. The principal mining there is quartz. The ore is a blue-white quartz, carrying about 12% in sulphides, lead, zinc, copper, iron, and some fine, free-invisible gold. The methods used are amalgamation and cyaniding. He found there a 40-stamp mill, with cyanide plant to correspond, but had difficulty in getting the values. The stamp mill could save but a very small proportion of the values, and the cyanide mill was doing little or nothing. He finally raised the extraction from 10% to 70% of the material treated. It is amalgamation followed by cyaniding. There are numerous old Spanish mines which were worked 200 years ago. He had to pack everything on mules for 50 miles. The biggest enterprise in the country is the Guayaquil & Quito Railway, between those two cities. Quito is the capital of Ecuador and is situated away up in the mountains. The distance between the two cities is 300 miles, and about 75 miles of the railway is built. At present they are making little progress.

SUMATRA.

J. F. Parks, superintendent Kennedy mine, Amador county, Cal., has a letter from H. A. Gelsendorfer which, published in full in the Jackson, Cal., Dispatch, is interesting. He says he is 250 miles north of Padang. His concession on the headwaters of the river Godio includes 25 miles of that river from its source and 500 meters on each bank. The country is covered with jungle. A zone of badly metamorphosed slate crosses near the head of the concession. Limestone is plentiful, but the greater bulk of the formation is made up of igneous rocks, granites, diorites, gabbros, porphyrys, diabases, andesites, basalts, acid tufts and conglomerate. Contacts are numerous, but as a rule are barren, and without a vein; when a vein is present it is generally a small one of limestone. A cobble of quartz in the river is quite uncommon, and a color of quartz gold quite as rare. All the gold in the river exists in very small thin flakes or in light porous porphyry gold. Much of the granite, syenite and diorite contain small amounts of gold. Eight cents per cubic meter is the best prospect. Good labor is obtainable at 20 cents per day (American), and find itself and water is abundant. The gravel will not average more than 5 cents (American); large boulders are plentiful in the wash; the gravel will not average more than 8 feet deep; all the available bars are cultivated rice fields, which, if worked, would have to be reconverted to agriculture. The gold is very light and hard to save, and the river cannot be worked on account of the recurring floods. He has reported unfavorably on the concession.

A doctor reported on this concession a year ago and he panned along the surface of the bars and reported millions of tons of gravel averaging two grams gold per ton (about \$1), and recommended putting four large dredgers on the river, with a grade of from 40 feet to 80 feet per mile, bed-rock often sticking above the water, boulders half the size of a house.

Mr. G. says: "I do not believe this will ever be much of a mining country. There may be a few good reefs and some dredging properties, but further than that there is not much prospect. This island has been mined for a thousand years. Two hundred and fifty years ago it was overrun by the Hindoos, who mined it with the precision of the Chinese."

THE KLONDIKE.

The Forty-Mile mining district reports that mining operations are being extended. The largest enterprise in the Forty-Mile district is being carried on by the Peterson brothers, who have been working for two years at Kink, or Bend river, 22 miles above the mouth of the North Fork. They are hacked by Chicago men, and by tunneling through the neck of the peninsula have diverted the channel of Forty-Mile river and drained absolutely dry nearly 3 miles of the North Fork river bed. The gold gravel of the former channel is being worked with horse teams and scrapers. Sluice boxes have been built, the gravel being scraped into them and washed with water taken from the Forty-Mile at the point where the stream was diverted. Fifty thousand dollars have been expended and the plant will be further extended by the hydraulic system to be operated with giants.

Teaming in Dawson is nearly all done with dogs; it costs \$1200 to winter a horse in that country.

Personal.

H. A. WILDER is manager of Northland mine, Loomis, Wash.

JOHN DERN has returned from California to Salt Lake, Utah.

M. WILLIAMS is now foreman Globe-Boston C. Co., Globe, Ariz.

D. R. WILLIAMS has taken charge of the Carlsbo mine, Tintio, Utah.

GEO. HENRY is superintendent Dragonoon C. M. & S. Co., Tombstone, Ariz.

C. A. MOLSON of Utah is examining mining property at Custer, Idaho.

E. C. LOFTUS has returned from the State of Maine to Railroad Flat, Cal.

M. F. SAMMON, foreman at the Gemini mine, Tintio, Utah, has resigned his position.

W. H. STORMS of Sutter Creek, Cal., is examining mining property near Copley, Cal.

M. NELSON, foreman Creston-Colo., Minas Prietas, Sonora, Mexico, is in San Francisco.

W. H. HOYT, vice-president Allis-Chalmers Co., has returned from Denver to Chicago.

S. C. HODGES is in San Francisco. He is successfully managing a 750-ton smelter at Granby, B. C.

L. H. CARVER has returned to San Francisco from an examination of Tuolumne Co., Cal., mining properties.

CHAS. D. WALCOTT, Director U. S. Geological Survey, is at Markleeville, Cal., viewing reservoir sites in that vicinity.

W. H. BUNCE of Ouray, Colo., has been appointed general superintendent North American Copper Co., Encampment, Wyo.

J. E. COOLIN, interested in York, Alaska, tin placers, says he recently found a 25-pound chunk of tin on Birch creek.

S. BOWERS, of the California State Mining Bureau, is at Chula Vista, San Diego Co., Cal., observing the oil indications there.

W. H. HAMPTON, Placer, Josephine county, Or., has charge of operations in the mines of the Columbia Mines Co., on Galice creek, Or.

T. T. LANE is in San Francisco from Nome to buy a 10-stamp mill to ship to Nome, Alaska, starting quartz mining on Seward peninsula.

F. M. BISBEE, late chief engineer Tennessee Central Ry., has been appointed general manager Los Angeles L. & W. Co., Los Angeles, Cal.

JOSIAH PHILLIPS, who had charge of the Mary Harrison 40-stamp mill, Coulterville, Cal., is now in charge of the Mt. Jefferson mill, Groveland, Cal.

GEO. FELT takes the position at the mill of the Idaho Springs M. & R. Co., Idaho Springs, Colo., made vacant by the resignation of A. G. Valentine.

W. S. BAKER, general manager General Concentrates Co. of New York, for New Mexico and Arizona, has gone from Tombstone, Ariz. to El Paso, Tex.

T. J. HURLEY, president Natalie and Occidental M. Cos., Colo., and Mines Securities Corporation of New York, has returned from Alaska to New York City.

MCLEAN & PROBERT, mining engineers of Los Angeles, Cal., are at Globe, Ariz., examining the mines and smelter of the Old Dominion Copper Co. for Boston capitalists.

R. MORAN, of the Moran shipbuilding yard, Seattle, Wash., was in San Francisco this week to get non-union men to work on the battleship Nebraska, being built by his firm.

W. A. PRICE succeeds F. H. Smith as assistant manager A. S. & R. Co. at Salt Lake, Utah, on the 15th. The latter assumes charge of the company's affairs at East Helena, Mont.

L. B. DOE and E. J. MOLERA, owners of the right to the Crown Gold dry concentrating process in Mexico, are in Durango to install a concentrating plant on mining property owned by the San Luis M. Co. near that city.

THOS. CORNISH of Georgetown succeeds A. J. Shipman as manager of the Stratton's Independence mine in Cripple Creek district, Colo. Mr. Shipman cabled his resignation to London Sept. 5, having received a flattering offer elsewhere. He and his assistant, R. J. Grant, will remain in charge of active operations at the mine for the present.

C. A. MALM and C. D. Porter, of San Francisco, are in Salt Lake, Utah, the guests of W. F. Snyder, president Western Exploration Co. Mr. Malm is one of the owners of the Balakiala group of mines, Shasta county, Cal., upon which the Western Exploration Co. has an option requiring the payment of \$750,000. The Tribune says he is there to close the trade with the company.

Latest Market Reports.

SAN FRANCISCO, Sept. 12, 1902.

METALS.

SILVER.—Per oz., Troy: London, 23½d (standard ounce, 925 fine); New York, bar silver, 51½c, refined (1000 fine); San Francisco, 51½c; Mexican dollars, 43½c San Francisco, 40c New York.

COPPER.—New York: Standard, \$11.00@11.50; Lake, 1 to 3 casks, \$12.25; carload lots, \$11.60; Electrolytic, 1 to 3 casks, \$11.75; carload lots, \$11.25; Casting, 1 to 3 casks, \$11.60; carload lots, \$11.30. San Francisco: \$14.00. Mill copper plates, \$17.00; bars, 18@24c. London: £53 7s 6d spot per ton.

LEAD.—New York, \$4.12½; Salt Lake City, \$3.50; St. Louis, \$4.00; San Francisco \$4.50, carload lots; 4½c 1000 to 4000 lbs.; pipe 5½, sheet 6, bar 5½c; pig, \$4.75. London: £10 17s 6d per ton.

SPELTER.—New York, \$5.50; St. Louis, \$4.50; London, £19 7s 6d per ton; San Francisco, ton lots, 6½c; 100-lb lots, 7c.

ANTIMONY.—New York, Cookson's, 9½c; Hallett's, 8½c; San Francisco, 1000-lb. lots, 10c; 300 to 500 lbs., 11c; 100-lb. lots, 13@15c.

TIN.—New York, pig, \$27.80; San Francisco, ton lots, 29c; 1000 lbs., 29c; 500 lbs., 29c; 200 lbs., 29½c; less, 30c; bar tin, 35c. London, £123 spot.

PLATINUM.—San Francisco, crude, \$18.00 per oz.; New York, ingot, \$19.00 per Troy oz. Platinum ware, 75@80c per gram.

QUICKSILVER.—New York, \$48 00 large lots; London, £8 15s; San Francisco, local, \$46.00 per flask of 7½ lbs.; Denver, \$49.75. Export, \$44 50.

BABBITT METAL.—San Francisco, No. 1, 10c; No. 2, 7c; No. 3, 6½c; extra, 17½c; genuine, 35c; Eclipse, 37½c.

ALUMINUM.—New York, No. 1, 99% pure ingots, 35c; No. 2, 90%, 30c to 34c.

SOLDER.—Half-and-half, 100-lb. lots, 19.50c; San Francisco, Plumbers', 100-lb. lots, 16½c.

NICKEL.—New York, 50@60c per lb.; ton lots, 45@48c.

STRUCTURAL MATERIALS.

IRON.—Pittsburg, Bessemer pig, \$21.75; gray forge, \$20.50; San Francisco, bar, 3c per lb., 3½c in small quantities.

STEEL.—Bessemer billets, Pittsburg, \$31 and \$31.50; open hearth billets, \$33 and \$34; San Francisco, bar, 7c to 12c per lb.

CHICAGO CURRENT QUOTATIONS.

Bessemer.....	\$24.00@24.50
Foundry Northern 1.....	23.00@24.50
Northern 2.....	22.50@24.00
Northern 3.....	22.00@23.50
Southern 1.....	22.15@22.65
Southern 2.....	21.00@21.65
Southern 3.....	21.00@21.15
Forge.....	20.00@20.65
Charcoal.....	25.00@24.50
Billets, Bessemer.....	33.00@34.00
Bars, iron.....	1.85@1.95
Bars, steel.....	1.75@1.85
Rails, standard.....	28.00@30.00
Rails, light.....	34.00@40.00
Plates, boiler.....	1.90@2.00
Tank.....	1.75@1.80
Sheets, 26 store.....	3.25@3.40
No. 27.....	3.35@3.50
No. 28.....	3.45@3.60
Angles.....	1.75@1.80
Beams.....	1.75@1.85
Tees.....	1.80@2.00
Zees.....	1.75@2.25
Channels.....	1.75@2.25
Steel melting scrap.....	19.50@20.00
No. 1 railroad wrought.....	21.00@22.00
No. 1 cast, net ton.....	16.50@17.00
Iron rails.....	24.00@25.00
Car wheels.....	21.00@22.00
Cast borings.....	10.00@10.50
Turnings.....	14.00@14.50

CEMENT.—Germania, \$2.90; K. B. & S., \$2.90; Hewmoor, \$2.85; Trowell, \$2.85; Portland, \$3.25 per bbl.

LIME.—Santa Cruz, \$2.00; Roche Harbor, \$2.00 per bbl.

LUMBER.—(Retail): Pine, ordinary sizes, \$20.00@22.00; extra sizes higher; redwood, \$22.00@23.00; lath, 4 feet, \$4.25 @4.50; pickets, \$19.50; shingles, \$2.35 for No. 1 and \$2.00 for No. 2; shakes, \$13.50 for split and \$14.50 for sawed; rustic, \$26.00 @32.00.

NAILS.—Per keg (list prices): No. 20d to 60d, Wire, \$3.50; Cut, \$3.50; 10d to 16d, Wire, \$3.55; Cut, \$3.55; 8d, Wire, \$3.60; Cut, \$3.60; 6d and 7d, Wire, \$3.70; Cut, \$3.70; 4d and 5d, Wire, \$3.80; Cut, \$3.80; 3d, Wire, \$3.95; Cut, \$3.95; 2d, Wire, \$4.20; Cut, \$4.20. Special rates for carload lots.

GENERAL SUPPLIES.

POWDER.—F. o. b. San Francisco: No. 1, 70% nitro-glycerine, per lb., in carload lots, 15½c; less than one ton, 17½c. No. 1*, 60%, carload lots, 13½c; less than one ton, 15½c. No. 1** 50%, carload lots, 11½c; less than one ton, 13½c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2*, 35%, carload lots, 9½c; less than one ton, 11½c. No. 2** 30% carload lots, 9c; less

than one ton, 11c. Black blasting powder in carload lots, minimum car 728 kegs, \$1.50 per keg; less car lots, \$2 per keg. CAPS.—3x, \$5.50 per 1000; 4x, \$6.50; 5x, \$8; Lion, \$9, in lots not less than 1000.

FUSE.—Triple tape, \$3.60 per 1000 feet; double tape, \$5.00; single tape, \$2.65; Hemp, \$2.10; Cement No. 2, \$3.00; Cement No. 1, \$2.65, in lots of 3000 feet and up.

CANDLES.—Granite 6s, 16 oz., 40s., 10c per set; 14 oz., 40s., 9c.

COAL.—San Francisco, coast, yard prices: Wellington, \$8; Seattle, \$6.50; Coos Bay, \$5.50; Southfield, \$8.00. Cargo lots, Eastern and foreign: Wallsend, \$7.00; Brymbo, \$7.50; Pennsylvania, hd., \$14.00; Scotch, \$8; Cumberland, \$12; Cannel, \$11.50; Welsh Anthracite, \$13.00; Rock Springs, \$8.50, long ton; Colorado Anthracite, \$14.00. Coke, \$13 per ton in bulk, \$15 in sacks; Sunnyside, \$8.50, long ton.

CHEMICALS.—Cyanide of potassium, 98%-99%, jobbing, 27@28c per lb.; carloads, 25@26c; in 10-lb. tins, 38c; sulphuric acid, in carboys, 66% B, 2c per lb.; soda ash, \$2.00 per 100 lbs.; hyposulphite of soda, 2½@3c per lb.; blue vitriol, 5½@6½c per lb.; borax, concentrated, 7@8c per lb.; chlorate of potash, 12@13c; roll sulphur, 5c; alum, \$2.00@2.25; flour sulphur, French, 2½@2½c; California refined, 1½@2c; nitric acid, in carboys, 8c per lb.; caustic soda, in drums, 3½@4c per lb.; Cal. s. soda, bbls., \$1.25 @1.50 per 100 lbs.; sks., \$1.05; chloride of lime, spot, \$2.50@2.60; nitrate of potash, in bbls, 8c; caustic potash, 10c in 40-lb. tins.

OILS.—Linseed, boiled, bbl., 57c; cs., 62c; raw, bbl., 55c; cs., 60c; lots of 5 bbls., 1c less; Lucol oil, boiled, bbl., 50c; cs., 55c; raw, bbl., 48c; cs., 53c. Kerosene—Pearl, per gal., 20c; Astral, 20c; Star, 20c; Extra Star, 24c; Eocene, 25c; Elaine, 22c; Water White, in bulk, 13½c; Mineral Seal, iron bbls., 19c; wooden bbls., 22½c; cs., 25c; Mineral Sperm, cs., 26½c; Deodorized Stove Gasoline, bulk, 17c; do., cs., 23½c; 86° Gasoline, bulk, 21c; do., cs., 27½c; 63° Naphtha or Benzine, deodorized, in bulk, per gal., 16c; do., in cs., 22c; Lard Oil, No. 1 bbl., 95c; cs., \$1.05; Neats-foot Oil, bbl., 70c; cs., 75c; No. 1 bbl., 52½@55c; cs., 57½@60c; Sperm, crude, 60c; Natural White, 65c; Bleached do, 70c; Whale Oil, cs., 55c.

WHITE LEAD.—Per lb., in kegs: Five tons and over at one purchase, per lb., 6c; 1 ton and less than 5 tons, per lb., 6½c; 500 lbs. and less than 1 ton, per lb., 7c; less than 500 lbs., per lb., 7½c; in 25-lb. tin pails, 4c per lb. above keg price; in 1 and 5 lb. tin cans, 100 lbs. per case, 2½c per lb. above keg price. Dry Lead—in bbls., 1 ton and over, 6c; do. in kegs, 6½c.

ASSAY LITHARGE.—Per lb., 8½c.

BISMUTH.—Subnitrate, per lb., \$1.60.

BONE ASH.—4c per lb.

BORAX.—Crystal, 7c; calcined, 25c.

CHROMIUM.—(90% and over) per lb., \$1.25.

COPPER.—Carbonate, 20c; Red oxide, 30c.

MAGNESIUM.—Per lb., \$3.00.

MANGANESE.—(90% and over) per lb., \$1.25.

MERCURY.—Bichloride, 30c per lb., 90c.

MOLYBDENUM.—25c. ½ gramme=2½ lbs.

PHOSPHORUS.—(American) per lb., 80c.

SILVER.—Chloride, 30c, 75c; nitrate, 55c.

SODIUM.—Metal, 30c per lb., \$1.00.

URANIUM.—Oxide, 30c per lb., \$3.50.

ZINC.—Metallic; chemically pure, 30c per lb., 50c.

ZINC.—Dust, 30c per lb., 10c.

ZINC.—Sulphate, 30c per lb., .04c.

(These prices are wholesale, f. o. b. San Francisco, unless otherwise noted.)

Commercial Paragraphs.

The Jeanesville Iron Works Co., Denver branch, has sold the El Paso Con. G. M. Co., Cripple Creek, Colo., a triple expansion pump, capacity 21,000 gallons, 750-foot lift, latest pattern, fitted with Corliss steam valves, the largest pump in that district. They are also building a compound condensing pump, 1000 gallons per minute, 1000-foot lift, for the Golden Cycle M. Co., Colorado.

N. S. CLARKE, manager Yreka Copper & Development Co., Victoria, B. C., has ordered from the Compressed Air Machinery Co., San Francisco, a 10-drill compressor.

Books Received.

"Materials of Machines," A. W. Smith, Leland Stanford Junior University, California. Contents: Outline of the Metallurgy of Iron and Steel—Testing; Stress-strain Diagrams; Cast Iron; Wrought Iron and Steel; Alloys. Prefatory Notes: "This book is the result of an effort to bring together concisely the information necessary to him who has to select materials for machine parts." 12mo, v + 142 pages, 17 figures; cloth, \$1. New York: John Wiley & Sons.

Catalogues Received.

"Song of the Elevator," with a bar of music, is the latest leaflet issued by A. Leschen & Sons Rope Co., 920-922 North First street, St. Louis, Mo., illustrated stanzas that show considerable merit and originality. The scene of the story is set in San Francisco.

From the Denver Engineering Works Co., Thirtieth and Blake streets, Denver, Colo., is received their new bulletin No. 1016, describing and illustrating the spitzkasten or hydraulic classifier which they have developed and designed for commercial use from the experiments made by R. H. Richards, professor of metallurgy in the Massachusetts Institute of Technology. In this they direct special attention to the letters on page 7, showing the saving effected by this apparatus in actual practice. Of further deserved notice is the completeness of the bulletin in giving the general dimensions, shipping weights, export shipping weights, and space taken by shipment. On page 10 appears what they consider the first publication of a table giving the size of the particles passing through a screen, which we do not remember seeing anywhere before, and which is of more than ordinary interest and value. The bulletin is gotten up in the usual handsome style of the company, and will be mailed on request to any address.

New Patents.

DEWEY, STRONG & CO.'S SCIENTIFIC PRESS PATENT AGENCY, 330 Market St., S. F., has official reports of the following U. S. patents issued to Pacific coast inventors:

FOR THE WEEK ENDING SEPT. 2, 1902.

708,294.—CUPIDOR RACK—F. F. Ball, Sonora, Cal.
708,453.—OLIVER BURNER—W. N. Best, Los Angeles, Cal.
708,114.—ROLLER BRAKE—L. H. Bill, S. F.
708,116.—TURNACE—M. P. Boss, S. F.
704,117.—HOSE COUPLING—V. F. Bowers, S. F.
708,199.—HAY DEHICKER—E. Brust, Davisville, Cal.
708,312.—FLOW—H. Bryan, Modesto, Cal.
708,323.—SWINGING BAR—F. R. Buck, S. F.
708,461.—TIDE MOTOR—E. B. Cade, Skagway, Alaska Ter.
708,332.—STEERING GEAR—P. L. Ehner, S. F.
708,135.—WATER TOWER—H. H. Gorter, S. F.
708,341.—WARDROBE—D. G. Graff, Fresno, Cal.
708,139.—MUSIC CHART—C. M. Halvorsen, Los Angeles, Cal.
708,353.—WALL PLASTER—C. R. Harris, Los Angeles, Cal.
708,354.—WALL PLASTER—C. R. Harris, Los Angeles, Cal.
708,227.—STEAM TURBINE—R. B. Hewson, S. F.
708,232.—SPROCKET WHEEL—D. C. Jackling, Republic, Wash.
708,233.—HOOP LUG—P. C. Jurs Jr., S. F.
708,159.—CULTIVATOR—A. K. Kopperud, Byron, Cal.
708,375.—WINDMILL—T. W. Lowe, Stockton, Cal.
708,064.—CULTIVATOR—J. A. McKinnon, El Cajon, Cal.
708,089.—BICYCLE BRAKE—G. Stahlte, S. F.
708,103.—PIPE COUPLING—H. H. Warner, Tacoma, Wash.
708,041.—PIPE JOINT—H. H. Warner, Tacoma, Wash.

Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

ABDOMINAL BANDAGE.—No. 706,715. Aug. 12, 1902. Mildred T. Barnett, San Francisco, Cal. This apparatus is designed to provide a bandage for abdominal support and like uses. It consists in the formation of a universally elastic bandage made up at the part to be supported by cutting gore from the top and bottom, bringing the parts together and uniting the edges of the cut out portions, in addition to which reinforcing pieces are applied and elastic reinforcing strips wherever there is an increased pressure upon any part. The edges of the bandage are also reinforced and have means for the attachment of connecting strips and hands.

PRINTING PRESS.—No. 706,709. Aug. 12, 1902. H. B. Allen, San Francisco, Cal. Assigned to J. D. Spreckels of same place. In this invention, what is known as a "quadruple perfecting press," has combined with it a mechanism by which a web of paper not exceeding one-half the width of the press is taken from the rolls, passed through one side over a printing roller, thence returned to the starting point and again passed through and over printing rollers within the other half of the press where a second color or impression is applied, thence the web is transmitted to the second portion of the press which stands at right angles with the first portion, and is in like manner carried through and over rollers by which the third color or impression is applied to the sheet before it passes to the folders and eventually leaves the apparatus.

FORMING STATUARY AND OTHER ORNAMENTS.—No. 706,775. Aug. 12, 1902. Felix Peano, Oakland, Cal. This invention is especially designed for the formation of statuary or other ornamental structures and consists in imparting an outline to a natural cellular body, then varnishing with an outer coating applied in a plastic state, so that it will enter the cellular structure and form a bond or union therein.

STEAM TURBINES.—No. 706,227. Sept. 2, 1902. R. B. Hewson, San Francisco, Cal. This invention relates to an apparatus in which steam or other elastic medium under pressure is employed expansively to propel a revolvable part mounted upon a shaft through which power is eventually transmitted. It consists of an approximately cylindrical or conical part and a correspondingly shaped casing within which the first portion is journaled to fit and revolve, both of said parts

having reversely disposed open hockets (interior to the fitted contiguous surfaces, with intermediate barriers, and means admitting an elastic medium under pressure to pass alternately through said hockets.

HOOP LUGS.—No. 708,233. Sept. 2, 1902. P. C. Jura Jr., San Francisco, Cal. The object of this invention is to provide a simply constructed adjustable friction locking lug that will not require any preliminary or subsequent bending or heating, or riveting of the hoop ends used upon tanks, tanks and like cylindrical structures. It consists essentially of a chambered hook carrying roller friction members which are adapted to clamp and hold a hoop band when the latter is inserted into the chamber.

SITUATIONS WANTED.

Cyanide and Stamp Mill Superintendent or Assistant Manager open for engagement after September 1st. Graduate. A thorough assayer and chemist; also accountant. Speaks Spanish. Will go anywhere. Specialty, construction; also successful treatment of low-grade and slimy ores. References "A.I." Address Practical, this office.

Position wanted by young man with six years' varied experience at mines and mining plants as Asst. Supt., etc. Can assay, survey and attend to office work. Address A. D., this office.

ASSAYER wishes to change position. Is also experienced amalgamator and miner. Would like to take charge of small plant. Speaks Spanish. "Alenian," Mining and Scientific Press.

Wanted, position by a first-class amalgamator and millman; also mining engineer and understands assaying; has had 15 years' practical experience in mining and milling; understands the erecting of milling machinery; best of references exchanged. Willing to go to any part of the country. Address Amalgamator, this office.

GOLD DREDGING.—Mining engineer with 8 years practical experience in gold dredging, is open for an engagement. X. Y. Z., care Mining and Scientific Press.

WANTED.

Position as Superintendent or assayer. Have had experience in mining, milling, cyaniding, smelting and putting up machinery and operating the above. Have a good assay outfit. Can sharpen tools. J. L. Wetmore, 1223 S. San Joaquin St., Stockton, Cal.

A mining engineer with thorough technical and business training and 12 years experience as manager, superintendent and engineer, proficient in Spanish, wants position with reliable parties. Reference furnished. Address "Cedroa," this office.

WANTED.—Employment at mine by young, experienced Assayer, Surveyor and Bookkeeper. References. Address A. H., care of this office.

COMPETENT SUPERINTENDENT wants position in California; 15 years' experience in running mines, mills and smelters for profit, and managing men. College bred and technically educated. Formerly held positions as assayer, mining engineer, accountant, superintendent and manager. Member A. I. M. E. High testimonials. Address "Superintendent," Box 813, Seattle, Wash.

ASSAYER and MILLMAN will be open for engagement after Oct. 1st; has been employed for past two years in one of the largest modern amalgamating and concentrating mills in Colorado; had seventeen years experience in assaying or millwork, seven of which was in a Government Mint. Correspondence solicited with reliable parties only. Address R. S. B., care of Mining and Scientific Press, 606 Mack Block, Denver, Co.

WANTED.

IMPORTANT--ADAM D. GLACE.

Wanted to know address of Adam D. Glace, who left San Francisco for Alaska about two years ago. Please write S. H. Lucas, 1016 S. Olive St., Los Angeles, Cal.

WANTED.—BY TWO ENERGETIC AND EXPERIENCED mining men the acquaintance of persons interested in the development of mining property in old Mexico. Address D. L. C., care of this office.

Wanted to Bond a Dry Placer Claim, One Rich in Flour Gold.

Must be a dry proposition. Address "Placer Claim," care this office.

WANTED.

ENGINEERS, MACHINE DRILL MEN AND TOOL SHARPENERS.

Address QUARTZ MINE, care MINING AND SCIENTIFIC PRESS.

WANTED TO DISPOSE OF A Quantity of Brass and Steel Wire Battery Screen.

Address Box 66, care Mining and Scientific Press.

THE CALIFORNIA DEBRIS COMMISSION having received applications to mine by hydraulic process from John Schaefer in Eda Mine, near Spanish Ranch, Plumas County, Cal., to deposit tailings in dam draining into Quilen Sake Creek emptying into Feather River; from W. J. Edwards, U. S. Webb and F. W. Hogan, in Edwards Placer Mine, near Quincy, Plumas County, Cal., to deposit tailings in dam draining into Black Hawk Creek which reaches Feather River; from Harlan Bros., in Last Resort Mine, near Sierra City, Sierra County, Cal., to deposit tailings on their land draining into Howard Creek which reaches South Fork of Yuba River; and from James Broad, in Robert Burns Gravel Mine, near Placerville, El Dorado County, Cal., to deposit tailings on flat draining into South Fork of American River, gives notice that a meeting will be held at Room 93, Flood Building, San Francisco, Cal., Sept. 29, 1902, at 1:30 P. M.

MINING AND SCIENTIFIC PRESS

Whole No. 2200.—VOLUME LXXXV.
Number 12.

SAN FRANCISCO, CAL., SATURDAY, SEPTEMBER 20, 1902.

THREE DOLLARS PER ANNUM.
Single Copies, Ten Cents.

La Cananea, Sonora, Mexico.

Much has appeared herein concerning La Cananea and the great region to which its success is now attracting deserved attention. There is prospect of great mineral development in that district, capital finding good opportunity for investment. La Cananea has 10,000 people. A company has acquired the Cananea Copper Co.'s railway from the town of La

Cananea to Naco, Sonora, Mexico, and the intent now is to extend it to the Yaqui Copper Co.'s properties at Campo Santo Nino, the coal deposits of La Barranca, through Sahuaripa and Alamos districts to the town of Alamos, thence into the State of Sinaloa to a gulf harbor.

The illustrations herewith are of outside workings at the La Cananea smelter. There are seven hot blast copper matte furnaces, total daily capacity 2500 tons ore, at the Cananea plant. The furnaces are rectangular, the longest, 42x210 inches, smelting 400 tons of ore per day. Each furnace rests on from eight to twelve jacks, with bed and fire castings supporting the firebrick hearth. The water-jackets are 6 inches thick, built in vertical sections, flange-bolted and held by backstays. Unlike the Bisbee, Arizona, furnaces, from which matte and slag are drawn together into settling wells, there are two tap holes, the slag being drawn at one end. The blast, after being heated in its passage down the upper walls of the furnaces, is admitted into tuyeres, tubes 5 inches in diameter, under a pressure of two pounds per square inch. Over all is the big chamber in which the fine dust carried by the ascending column of hot gases is

detained until it can fall back and be smelted. This is designed to dispense with the dust chambers, etc., as employed at Bisbee and Jerome.

Each charge is 2000 pounds of ore with about 10% of fuel. The matte when cool is cracked up with sledges and passed through crushers. Each day's output constitutes a lot, the sampling of which is a task. It is heaped, spread and quartered three times. The residue is then ground and the quartering continued until only a handful remains for the assayer. At the furnaces a five-converter plant is being put in, designed by G. Mitchell, general manager at Cananea.

The new converters are of the barrel type, 8 feet diameter, 8 feet 6 inches long. Around each rod is a ninety-pound rail, resting on two supporting wheels. The converter is canted up and down by a hydraulic pump, whose piston rod is toothed and engages a pinion on the

converter. The stroke of the piston is nearly sufficient to give a complete revolution of the pinion and matte.

A Type of Gallows-Frame.

Considerable has appeared herein regarding construction of shaft head gear, illustrated by examples of California, Montana and Colorado styles and types. The subject is an interesting one.

Herewith is a halftone of the head gear just built at the River Hill mine, near Hayden Hill, Lassen county, Cal., from a photograph kindly furnished by Mr. E. H. Benjamin, who has been in active superintendency of the development work. Regarding the entire matter Mr. Benjamin says:

"There is not much to say about this simple construction, and nothing of any importance is claimed for it, except that the design is original, and found to be entirely satisfactory in every way. It takes less timber than the four-post gallows-frame, and in my judgment is exactly as strong and efficient.

"The rock breaker and ore bin are entirely separate from the main gallows-frame, the rock breaker being driven by a wire rope from an engine in the hoisting building. The shaft over which this gallows-frame rests is a three-compartment shaft, the two outside compartments being 4x4 feet in the clear, and the center compartment is 2½x4 feet. The two center posts in the shaft frame adds strength where strength is needed, and the center compartment is used as a ladder way and for air and water pipes. We have found that a most convenient system of timbering."

BRIQUETTES of coal waste are now common. There is, however, a further advance—the manufacture of petroleum briquettes, which in some ways obviate the few disadvantages ascribed to the ordinary briquette. This newest form of fuel is composed of 97% petroleum and 3% of hydro-carbon. The volume being equal, it weighs only half as much as coal and gives but 3% residue; produces no slag; does not run when lighted; keeps its form like coal; burns without odor and without smoke; can be wetted with impunity, losing none of its properties; consumes without explosion or sparks, yet with a bright and long flame, and can be kept indefinitely without deterioration. Refined petroleum is used in their test manufacture at St. Etienne, France.



The Dust Stack at La Cananea, Sonora, Mexico; 205 Feet High, 12½ Feet in Diameter.



Bird's-Eye View of La Cananea, Taken From Top of Dust Stack.



Dumping Slag Pot at La Cananea.



Head Gear River Hill Mine, Lassen County, Cal.

MINING AND SCIENTIFIC PRESS.

ESTABLISHED 1860.

Published Every Saturday at 330 Market St., San Francisco, Cal.

TELEPHONE, DAVIS 771.

ANNUAL SUBSCRIPTION:

United States, Mexico and Canada.....\$3 00
All Other Countries in the Postal Union.....5 00

Entered at the San Francisco Postoffice as second-class mail matter.

Chicago Office (Telephone, Harrison 73).....737 Monadnock Block.
Denver Office (Telephone, Olive 733).....606 Mack Block.

J. F. HALLORAN.....Publisher.

San Francisco, September 20, 1902.

TABLE OF CONTENTS.

ILLUSTRATIONS.—The Dust Stack at La Cananea, Sonora, Mexico; Bird's-eye View of La Cananea, Taken from Top of Dust Stack; Dumping Slag Pot at La Cananea; Head Gear River Hill Mine, Lassen Co., Cal., 155. Double Drum Corliss Hoisting Engine; Compressed Air Transmission, 164. Mining and Metallurgical Patents, 165.

EDITORIAL.—La Cananea, Sonora, Mexico; A Type of Gallows-Frame; Briquettes of Coal Waste, 155. Reports of Nome and Dawson; Loss of Head by Friction of Water Pipes; Change in Industrial Conditions; Memories of the Mineral Land Bill; U. S. Gold Production; Height of Earth Dams; Passing of the Old-Time Inventor; Action of the Cœur d'Alene Lead Miners; Iron and Steel Statistics, 156.

MINING SUMMARY.—166-167-168-169-170.

LATEST MARKET REPORTS.—17

MISCELLANEOUS.—Concentrates, 157. Mine Timbering by the Square Set System at Rossland, B. C., 158-159. Production of Borax; When Ice Ran Up Hill; Finder of Large Nugget Dead, 160. Some Useful Formulas; Protection of Wire Ropes; Prospecting for Oil, 161. Metallurgical Practice at the Greenwood Smelter; The Chlorination Process; Hydraulic Licenses, 162. What Constitutes a Mine; May Lundy Gold Mine, 163. Hoisting Engine at Oliver Iron Co.'s Mine, Ely, Minn.; Con. Mercur G. M. Co., Mercur, Utah, 164. Mining and Metallurgical Patents, 165. Personal; Commercial Paragraphs; New Patents; Notices of Recent Patents; Obituary; Catalogues Received, 170.

FROM the farthest north our Nome and Dawson correspondents send extremely different reports. Dawson is declining and its glory has departed. Nome is flourishing. Water was needed to make that camp a go, and it has it this season in plenty. The system is a practical replica of the California hydraulic system and is working well. Nome expects to show an aggregate gold output of \$7,000,000 this year.

SOME TIME ago was published herein a diagram showing at a glance the loss of head by friction of water in pipes. Its value was instantly shown by its reproduction in various technical journals and its use in catalogues and trade treatises. In this issue appears a similar diagram on "Compressed Air Transmission," prepared by the author of the first one referred to, Mr. D. E. Bigelow of San Francisco, Cal. The saving of time to busy men by the existence of such diagrams is manifest to every busy man, and the calculations and figures throughout may be relied on as being accurate.

THE change in industrial conditions on the Pacific coast is illustrated by the fact that to September 1 171 San Francisco concerns have changed from coal to fuel oil for use in their steam plants, and over 1000 others in the State of California outside the city of San Francisco have done the same. The thing figures down to a brief business basis. Steam coal has all along brought at least \$6 per ton, delivered. Four barrels of oil equal one ton of coal for steam purposes. Oil is delivered in San Francisco for 55 cents per barrel. California's present annual consumption of crude oil is about 12,000,000 barrels.

MEMORIES of the mineral land bill are recalled by the present wholesale grabbing of mineral land by timber land speculators, thus diminishing the area of public land and shutting out the prospector, in numerous cases the tracts thus secured including mining locations by bona fide miners and prospectors on which assessment work is pending. In such action the spirit of the law is violated. The Act of June 3, 1878, makes it mandatory for those taking up timber land under its provisions to make oath that the land is valuable only for timber, but it is plainly shown that in a number of cases the tracts now being segregated are taken solely because of their manifest mineral wealth. Then, too, much of this land is being taken for large corporations by dummy entries—men furnished with money to pay for 160-acre tracts, to be subsequently transferred to their employers. The result is plainly injurious to the miner and prospector, and the attention of the Federal Land Department is directed to this flagrant violation and evasion of law.

U. S. Gold Production.

The slight drop in this country's gold production in 1901, as compared with that of 1900, is the subject of considerable comment, and in some cases the relief has been expressed that high water mark now has been reached.

Gold production has fluctuated considerably. The output for fourteen different years, averaging along since 1848, is given as follows:

1848.....	\$10,000,000	1878.....	\$51,200,000
1853.....	65,000,000	1883.....	30,000,000
1862.....	39,000,000	1886.....	35,000,000
1866.....	53,500,000	1898.....	64,463,000
1868.....	48,000,000	1899.....	71,053,000
1870.....	50,000,000	1900.....	79,171,000
1875.....	33,400,000	1901.....	78,666,700

(Of course it is understood that the great jump between 1848 and 1853 was due to the discovery of gold in California). It is interesting to note that none of the years from 1853 to 1898 showed an aggregate gold output equaling that of the former year. The reason is not hard to find. Up to 1894 the high price and low cost of silver made that metal more sought after. Since then the demand for gold and the cheaper chemical processes of its production created a rapidly increasing production.

The slight difference of half a million dollars between the 1900 and 1901 gold production is of no significance, as that might have been caused in any one of the gold producing States by local conditions. Says an Eastern writer:

Of all results of activity gold is the soonest put to use, for the reason that it is the one that will give the quickest returns. Grain may be stored in bins or held in elevators and manufactures may be piled up in warehouses until consumers are found. But the consumer is always demanding gold and it gets to work, so to say, as soon as it is harvested in the refinery. It is besides practically indestructible and is used continuously. These things give the larger production of recent years not only credit for much of the prosperity they have known, but have an important bearing upon the future of business. It is probably the case that newly produced gold finds its way into business quicker in this country than in any other, owing to the gold fields being nearer the centers of finance and the machinery for its conversion into forms of use being more perfect than elsewhere. Its ordinary effect is by increasing permanent capacity to lower rates of interest and by lowering rates of interest to make the desire for means of employing capital more keen. It so keeps going the whole process known as "business." Judged by this rule, the large output must have done much in the past three years and has still capacity for doing more in the years to come.

In this regard is deemed of interest some recent remarks on this subject by Waldemar Lindgren of the U. S. Geological Survey, who in a paper on "The Gold Production of North America, its Geological Derivation and Probable Future," read by him before the recent session of the Mining Congress at Butte, Mont., in a comprehensive way cited the different geologic ages and their effect upon gold production on this northern half of the American continent. He brought out prominently the fact that on the Pacific coast most of the gold produced had been obtained from placers, and said: "If no further great discoveries are made in this region our knowledge of placers forces us to the belief that this last figure (the production from the Yukon and Alaska) will rapidly decrease. Even if the placers gradually decline in the northernmost territories it is believed that increased quartz mining will to some degree compensate for this; but the quartz mines have usually in the older districts yielded less than the corresponding placers. California's output will doubtless be maintained at about the present figure for many years."

In Utah, Idaho, Colorado and Montana, he instances that gold production is closely associated with the silver and copper industry, and he says: "The effect is perhaps to make it more stable. According to past experience no wonderful increase of production may be expected, but rather, perhaps, a gradual increase. Placer mining, with its dwindling tendency, is almost eliminated in the consideration of this belt."

Discussing another class of gold-bearing veins of a prophyllitic character, in more particular reference to Mexico, Arizona, New Mexico and portions of Colorado, Mr. Lindgren ventures the opinion that throughout that region the gold output will continue to increase. He says: "The output of the pre-Cam-

brian veins will probably continue steady for many years. Owing to gradual exhaustion of Northern placers (if no new important finds are made) the output from the Pacific Cretaceous belt will probably decrease. California may be expected to hold her own for many years, and increase is probable in Idaho and Oregon. The central Cretaceous veins may be expected to hold their own, except if for some reason the copper and silver industries should decline.

"Regarding the output from the prophyllitic veins in the United States a decrease is probable if no new discoveries are made."

THE current number of Engineering News cites the fact that the former maximum height of 70 to 80 feet attained by earth dams has of late been exceeded, and mentions, among others, four in California considerably exceeding that height, one, the San Leandro dam, of the water works of Oakland, Cal., 121 feet, and projected for an ultimate height of 175 feet above the natural surface. It is to be further noted that the latter structure was built by Anthony Chahot, a hydraulic miner, and that the sluicing method was largely employed. Schuyler, in his work on reservoirs, says of the dam: "The water was brought 4 miles in a ditch, and the sluiced materials were conveyed in a flume lined with sheet iron plates and laid on a grade of 4% to 6%. The water used was 10 to 15 sec. ft., and the ground sluicing method was alone employed, as it was not convenient to get water under pressure. The cost was estimated at one-fourth to one-fifth that of putting the earth in place with carts or scrapers." The Engineering News, in commenting on the subject, says that these high earth structures "may be considered as forerunners of the bold work in long distance electrical transmission, which is making the Pacific Coast notable in these later days."

THE old time inventor of popular fancy is passing. The frenzied, impractical genius, with his eye fixed on futurity, and disregarding the bread-and-butter requirements of the present, is obsolescent. The man who evolves brilliant ideas as one divinely inspired, and invents as easily as some men eat, is out of date. Great inventions now come from systematic study and clear, continued thought. (As a matter of fact, they always did.) It is now the custom in great establishments to have an inventor, as one would have a manager or cashier. He is a part of a modern manufacturing plant. It is his business to invent. He is educated to think, observe, compare, create and cleverly use intelligence, aptitude and energy. He keeps in touch with the present state of the art and is abreast of the times in all improvements in his line. The dreamer, the man with seven golden-haired daughters who patiently await bread while their gifted father breaks the furniture for fuel to perfect his invention, no longer exists off the stage. The new inventor is told what is wanted and thinks it out. Indeed, a good many of us are inventors without knowing it.

THE action of the Cœur d'Alene lead miners is the only logical outcome of the present situation in western lead mining. The thing is whittling down to the point whether the smelting combination must own the mines as a part of their general business or the miners themselves own and operate their own reduction plants as part of their general business. The business whatever it is or whoever has it must be run on business principles and in accordance with the rules of the game. The way the game has been played by the smelter trust during the past two years in Colorado and Idaho makes it impossible of continuance.

IRON and steel statistics show some interesting facts. Comparing the figures for 1890 and 1900 of that branch of the country's mining industry, it is noted that in the latter year there was \$176,000,000 more capital invested than in 1890. In 1900 there were 50,000 more wage earners than in 1890, and they earned \$31,000,000 more. The gross tons of product in 1900 showed an increase of 80% over that of 1890, while that last decade showed an increase of 150.7% over the preceding decade. The price per ton of the total product was \$63.49 in 1870; \$45.70 in 1880; \$29.43 in 1890; and \$27.24 in 1900.

Concentrates

THERE is no law to prevent men from any country obtaining work in Canada.

WITH a 400 H. P. duplex first-motion winding engine 150 revolutions per minute, efficiency 70%, load upon the rope two tons, the diameter of the drum should be 5 feet.

AN iron ore assaying 35% metallic iron and 5% chromium would not be of augmented value because of the chromium carried. It would involve increased expense in smelting the ore.

IT is probable that were the figures obtainable it would be found that, in Western metal mines, there are 500,000,000 tons water annually raised, which, estimating at a cost of 2½ cents per ton, is an aggregate annual expense of \$12,500,000.

"CONCENTRATES" knows no exact rule by which to calculate the bursting pressure of a gauge glass, this is largely due to varying dimensions and difference in tensile strength. The bursting pressure ranges from 400 to 800 pounds per square inch.

A 1000 H. P. direct-connected gas engine has been in constant use at Lancaster, Ohio, for the past eighteen months. A 300 H. P. gas engine built by the Union Gas Engine Co. of San Francisco, is the largest of the kind yet built on the Pacific coast.

TO SLUICE tailings from tanks will take from 300 to 450 gallons water per ton of ore. A stream of 375 gallons per minute under 140 pounds pressure through a ¾-inch nozzle will sluice 30-mesh tailings from circular tanks at the rate of sixty tons per hour.

A CYLINDER STEAM BOILER 36 feet long, 36 inches diameter, eighty pounds steam pressure, would have about 12½ H. P., but exact data could be given only by knowing the weight of water evaporated per hour and the temperature of the feed water.

THE illumination from a gas jet is not proportional to the gas consumption. A gas burner will give its normal light, say 16 candle power, when it is burning perhaps 5 cubic feet per hour, and will give very little more light if the pressure be increased to 7 or 8 feet.

THE August electrical display of street lighting in San Francisco, Cal., involved the placing and nightly lighting of 30,000 incandescent electric lights. The work cost \$10,235. The lighting cost \$1.19 per 100 lights per night. In both cases the amount named was the actual cost to those who did the work.

THE best way to get a correct assay is to get a battery sample, a sample from the powdered mixture of the general product. A carload coming up from the mine does not represent the vein of ore; a handful from each car does not represent the contents of the car; the part taken from these samples for assay tests is not representative.

IN the case of Tuolumne Con. M. Co. vs. Maier (Cal.) 66 Pac. Rept. 863, the court held that: "Any rights acquired by a discovery of mineral on a mining claim subsequent to the construction of a ditch across the claim by a third person are subject to the easement of the ditch, and to its owners' rights as a prior appropriator."

WHEN a ship is sailing at a uniform speed the force exerted on it by the wind causes no change in its motion, but simply prevents such a change being produced by the resistance of the water; or, when a railway train is running with uniform velocity, the force of the engine does not change, but only maintains its motion in opposition to the forces, such as friction and the resistance of the air, which tend to destroy it.

THE requisite assessment work for a group of contiguous or adjoining claims can be done on any one of them if the work on the claims thus associated can be shown to be beneficial to all—that is, it must manifestly tend to the development of all the claims in the group. The aggregate amount of the expenditure of money or labor on one claim for this annual assessment must equal in value that which would be required on all the claims if they were not adjoining or if under separate ownership.

MINING ENGINEERS in their professional papers on technical subjects, as read at gatherings and published in trade journals, are more apt to give cost figures, prices of work, etc., than either mechanical or electrical engineers. Costs and prices are among the vitally important points of detailed information and it is the custom for mining engineers to be minute in their cost specifications. It is not designed reticence on the part of others that causes the omission. It is largely a matter of custom and precedent.

THE pressure on any perpendicular exposed surface occasioned by wind can be figured in pounds. The square of the velocity in miles per hour $\times .005$ = the pressure in pounds by square foot; so that a wall 15 feet wide and 20 feet high would have a total pressure against it produced by a 40-mile wind of 2400 pounds. Conversely, the velocity of wind can be figured from the observed pressure by the formula $\sqrt{200 \times \text{pressure in pounds per square foot}}$. For instance, a wind pressure of 8 pounds per square foot would show $200 \times 8 = \sqrt{1600} = 40$ miles per hour.

THE tables, formulae and figures under the head of "useful information" in mining machinery catalogues

are usually made up by competent men in the employ of the concern issuing the catalogue, and are generally correct. It is possible in the case referred to by our South Dakota enquirer that there is a slight discrepancy, and, doubtless, if the firm publishing the catalogue had its attention directed to the assumed error, the calculation (if a mistaken one) would be corrected in future editions. It is to be noted that the term "gallon" is by itself indefinite, as it may be the equivalent of 231 cubic inches, or 268.8 cubic inches, according to the kind of "gallon" it is. There is a necessary "correction factor" in a good many engineering calculations. It is sometimes better not to know so many things than to know so many things that are not so.

THE U. S. mining statutes make no mention of Sunday, and only require a certain amount of work to be done, therefore Sunday work done is as good as work done on any other day. It has been decided that work done on a claim to the extent required by statute holds the claim, regardless of the minority of the locator. The discoverer of a lode may, so far as the U. S. statutes are concerned, hold as many claims on the same lode as he can do the assessment work on. Sometimes district mining laws give the original discoverer the first choice of two or more claims, and all others one each, and in such cases the district laws are recognized by the courts, being in the nature of an agreement by interested parties. In no case can any one claim exceed the statutory limit—1500x600 feet.

WHEN a boiler plant is lower than the buildings which it supplies, the course of the live steam is generally up the hill, and the tendency of the water carried into or formed in the pipes is to move in a direction contrary to the flow of the steam. If the boilers were on the hill, the flow of steam would be down hill and flow of the water would be in the same direction as the steam flow. With a hill plant, the chimney could be carried considerably above the surrounding buildings. With regard to carrying the condensation from the buildings to the central station, it makes little difference where the station is; the power to send the water back must be at the point where the condensation takes place. Usually the water must gravitate at the lowest point in a building and be taken by pumps and sent up the hill, if there is one.

IRON ORE is now reduced to a metallic state in the blast furnace. A huge cylinder set on end, into the top of which ore, fuel and flux are dumped, while air is forced in near the base by blowing engines. A modern blast furnace requires about a ton of coke per ton of pig iron produced, the quantity varying, of course, with the efficiency of the furnace plant, the composition of the ore, and many other factors. Of all the heat generated by the combustion of the coke, about one-quarter is expended in reducing the iron ore from the form of an oxide to a metallic state. It must be understood that the union of oxygen with iron produces heat, just as does the union of oxygen with coal or with hydrogen gas; and the heat produced is a fixed and definite quantity for a given weight of iron. When the iron and the oxygen are forced apart, heat is absorbed, and just the same amount of heat that was liberated by their union. The heat required to reduce a pound of metallic iron from its ore amounts to 3396 heat units.

A COLD CHISEL for heavy chipping should be sharpened slightly oval or rounding. A tool sharpened thus will stand harder usage than when the cutting edge is concave, or even straight. The reason for this is based upon the strength of the arch. The engineer builds a dam across a stream in the shape of a curve for the same reason, and both the engineer and the beaver, in his native stream, obeys the same law in regard to this matter. Aside from the principle of the arch, there is less danger of breaking the corners off of a chisel when the edge is curved, for then the force of the blow is supported in a brace-like manner by the metal in the curved corners, whereas in the concave point the same bracing action, applied in the opposite direction, tends to split off the corners of the tool. The matter is so simple that every machinist should take advantage of it to add strength and durability to his tools. The same shape can be given to screwdrivers when they are to be used in chucks on work like that of putting screws in shoemakers' lasts. Thousands of screws are thus put in, and it is found that if the end of the screwdriver is rounded off the least possible amount it is much easier to make the tool bit engage the slot in the screw. When the bit is the least amount of concave on the end it is impossible to make the screwdriver take hold when running even at a low working speed. Make the end of the tool convex one-thirty-second of an inch, and the speed at which the tool can be put into a screw slot will be doubled.

HOWEVER carefully the ore may be treated, a certain portion of gold remains in the tailings, varying, other things being equal, according to the character of the ore. In case this results, in part, from the presence of particles too large to be entirely dissolved, that portion can be extracted by re-treatment, either with gas, by chlorine water, or by amalgamation. But a portion, which is sometimes quite considerable, still remains, and resists every mode of chlorination or amalgamation, and can only be extracted by smelting with lead. In general, it may be said that gold which can be seen by the aid of a lens, after finely grinding, and carefully washing a sample of the tailings, can be extracted by chlorination or amalgamation; but that which cannot thus be rendered visible can neither be chlorinated nor amalga-

mated, even if the ore be re-roasted, with or without re-grinding. (If re-ground, it forms a pasty mass which cannot be leached, being almost impervious to water.) Of course, the ore is supposed to be properly roasted in the first instance. Concentrated sulphides containing gold, and free from lead, will frequently yield as much as 98% of the fire assay, if moderately rich, but the extraction of 95% is considered a good result, from ore containing \$100 worth of gold in a ton. As the material loses about 24% of its weight in the roasting and leaching, it will readily be perceived that, if there has been no sensible loss of gold in the roasting, the tailings from such ore will assay about \$6 per ton, and for every 100 tons of ore treated there will be 76 tons of tailings, containing \$456 worth of gold. Tailings of this character, consisting chiefly of iron peroxide, make an excellent flux for the smelting of galena. All the precious metal they contain is extracted, together with the lead set free from the galena by the action of the iron oxide, and may be considered as of profit to the smelter, who is obliged to use some kind of iron flux, and can find nothing, unless it be metallic iron, better adapted to his purpose than these tailings.

THE American Society of Mechanical Engineers charges for annual dues \$25 for members, \$15 for juniors. The American Society of Civil Engineers charges \$15 annual dues for members and associate members and \$10 for associates and juniors. The American Institute of Electrical Engineers charges \$10 per year for members and associates. The American Institute of Mining Engineers' charges are \$10 per year for members and associates. The California Miners' Association has charged \$1 per year for members, \$5 per year for members living in any of the counties that border on San Francisco bay. In all the organizations mentioned and in all other of similar character it is generally understood that the revenues run the concern and are used solely for that purpose. As a general thing officers and members of such organizations gladly give expert services for the good of the cause, services that if paid for at their worth would bankrupt the society's treasury. So far as "Concentrates" knows none of these organizations are incorporated. The three that he belongs to are not. There are reasons why such technical associations should be incorporated, and weightier reasons why they should not. One reason against incorporation is that should membership in the organization be necessary to the members of that profession an incorporated association would have no legal right to exclude applicants for membership because of personal reasons; this latter right is prescriptively conceded to voluntary associates, though seldom exercised.

TO CALCULATE the working energy that a given volume of water under a given head or fall is capable of producing, is determined by the weight and velocity of the water. The weight is an unvarying factor, a given quantity always weighing the same, but the velocity varies according to the height of column or head. The initial velocity of spouting fluids is directly as the square roots of the heights of the columns, or of the pressure, the initial velocity under a 4-foot head being 16.2 feet per second, and, the square root of 4 (2); to ascertain the spouting velocity of any other height, take its square root, divide it by 2, the square root of the 4-foot head, and multiply it by 16.2, the spouting velocity of the 4-foot head. With a head 16 feet high the square root is 4; divide by the square root of 4, which is 2, multiply by 16.2, and, as a result, we have 32.4, which equals the spouting velocity due to a 16-foot head of water. By the same rule is found that the spouting velocity due to a head 64 feet high is 64.8, for the square root of 64 is four times greater than the square root of 4, therefore the velocity must be four times greater than the velocity due to the 4-foot head. The initial spouting velocity of any other head of water can be ascertained by the same method of calculation. Measured by spouting velocity alone, it would appear that there is a relative loss of power as the height of the column of water increases. A 64-foot head is sixteen times the height of a 4-foot head, and yet the spouting velocity of the former is but four times greater than the latter. It must be remembered, however, that while the spouting velocity has been increased but fourfold, the pressure has been increased sixteenfold, so that against, say, one velocity and one pressure in the 4-foot head, there is in the 64-foot head four velocities and sixteen pressures, which means great increase in power, instead of a relative decrease. Thus a water wheel which would develop 2 H. P. under a 4-foot head, would develop 128 H. P. under a 64-foot head. Thus it will be seen that by raising the head sixteen times the power is increased sixty-four times. It is due, however, to say that, while theoretically the power is increased sixty-four times, the efficiency of the wheel under the high head is not in so great a proportion, on account of increased friction due to its greater speed. The speed of a wheel increases with the velocity of the water, therefore the speed of a wheel under a 64-foot head would be four times greater than it would be under a 4-foot head. This brings up another phase of the subject. While the 64-foot head develops four times as much power as the 4-foot head, four times as much water is consumed in doing it. When a given quantity of water is consumed in both cases, the power of the 64-foot head is but sixteen times that of the 4-foot head, or in exact ratio to the heights of the head. That is: A given quantity of water in a 64-foot head will develop sixteen times the power that it would in a 4-foot head, because the former head equals sixteen times the height of the water.

Line Timbering by the Square Set System at Rossland, B. C.*

By BERNARD McDONALD.

In mining operations, when the ore extracted exceeds a width of 10 or 15 feet, it has been found that the cheapest and only effective method of timbering is by the square set system.

The system may be generally described as a rectangular skeleton framework of timbers, extending from wall to wall of the vein as exhausted, the different members of which are so framed as to stiffen and support each other, and equalize and distribute local strains after the manner of a truss.

The invention of the square set system of timbering was made by Philip Deidesheimer, while superintendent of the Ophir mine, on the Comstock Lode, in 1860.

In Monograph IV of the United States Geological Survey, "Comstock Mining and Miners," the following reference is made, which will be found interesting under this heading:

"At the 50-foot level (of the Ophir mine) the vein of black sulphurets was only 3 or 4 feet thick, and could readily be extracted through a drift along its line, propping up the walls and roof when necessary, by simple up-rights and caps. As the ledge descended, the sulphuret vein grew broader until at a depth of 175 feet it was 65 feet in width, and the miners were at a loss how to proceed, for the ore was so soft and crumbling that pillars could not be left to support the roof. They spliced timber together to hold up the caving ground, but these jointed props were too weak and illy supported to stand the pressure upon them, and were constantly broken and thrown out of place. The dilemma was a curious one. Surrounded by riches, they were unable to carry them off.

"The company was at a loss what to do, but finally secured the services of Philip Deidesheimer of Georgetown, California, who visited and inspected the treasure-lined slopes of the Ophir."

During Mr. Deidesheimer's engagement at the Ophir, all the principles of square set timbering were evolved, under his immediate supervision, and the wide and rich ore bodies occurring in that mine were successfully extracted without the loss of ore or injury from caving by the use of this system. The system was then used in all the mines on the

IDEAL LONGITUDINAL SECTION

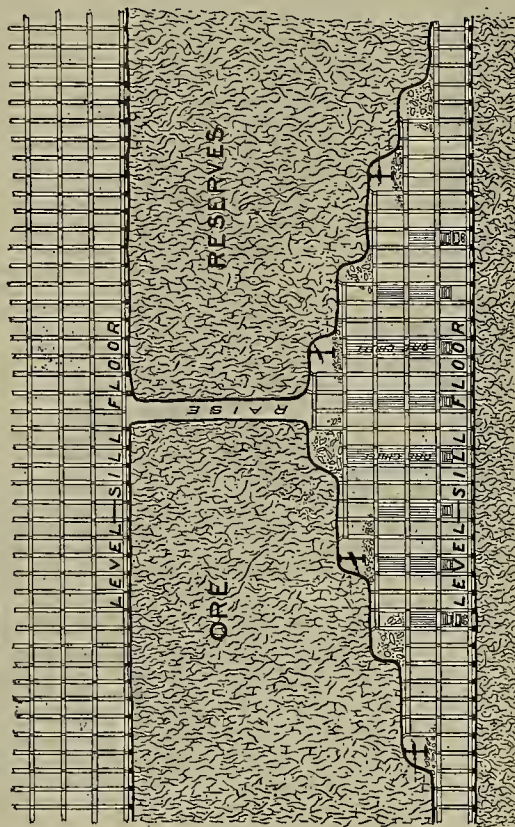


Fig. 5.

IDEAL CROSS SECTION

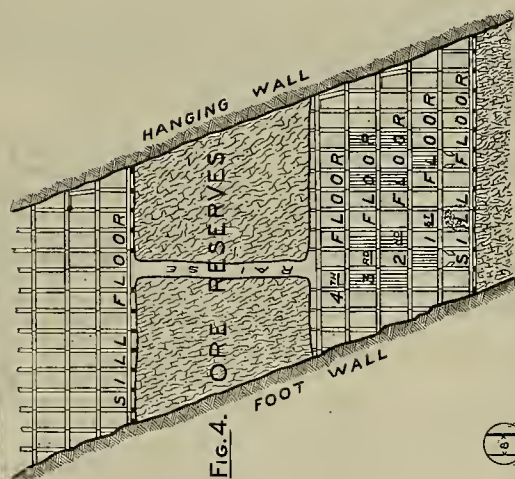


Fig. 4.

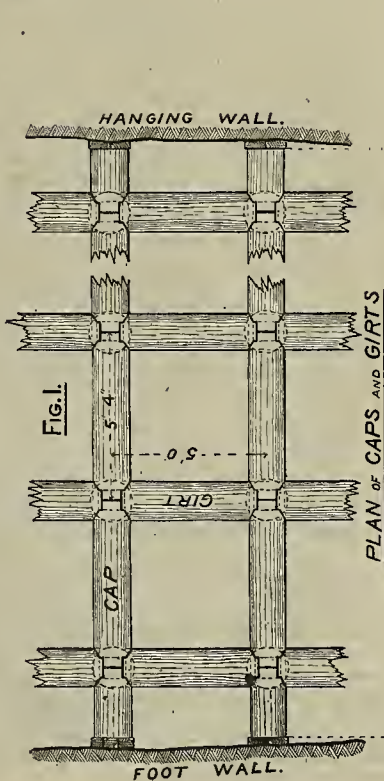


Fig. 1.

PLAN OF CAPS AND GIRTS

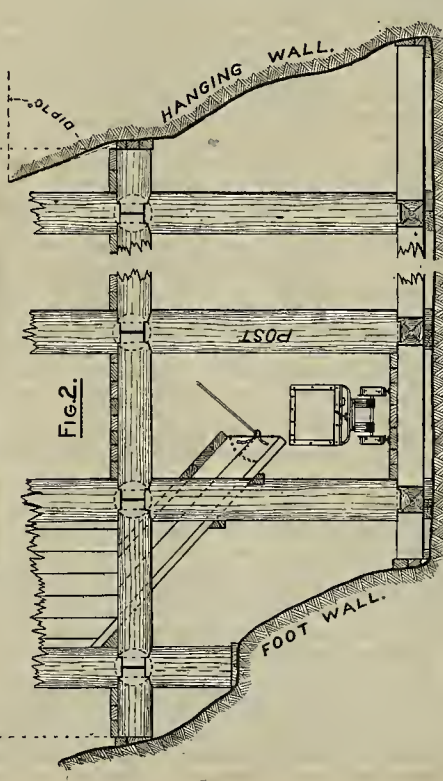


Fig. 2.

CROSS SECTION

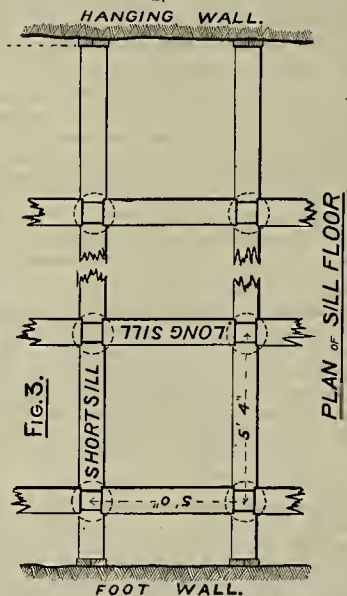


Fig. 3.

PLAN OF SILL FLOOR

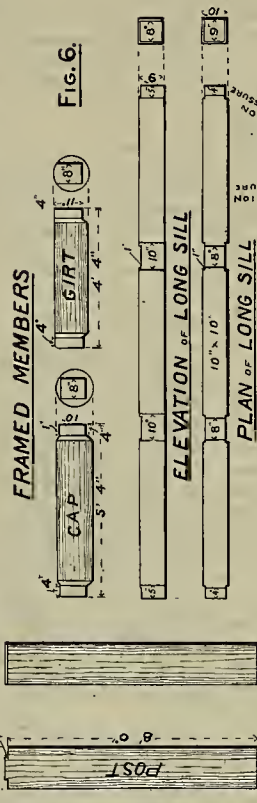


Fig. 6.

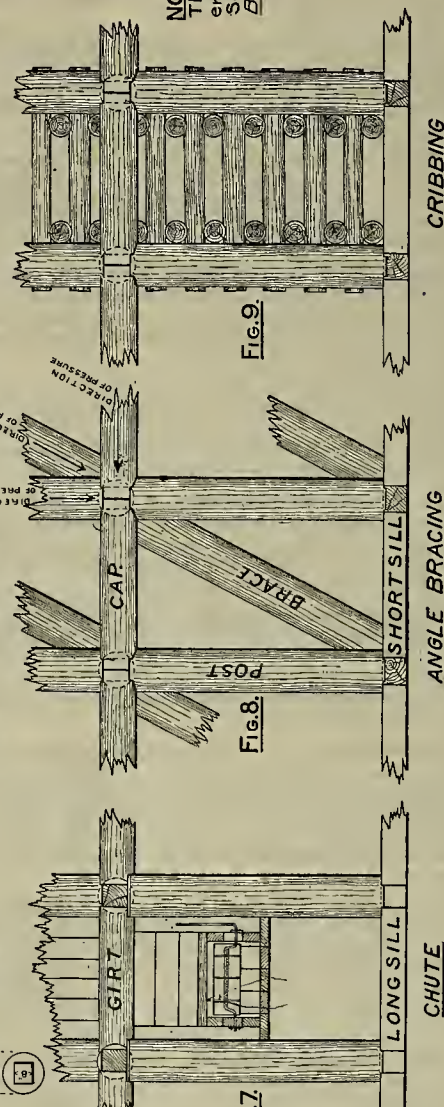


Fig. 9.

Fig. 8.

Fig. 7.

PLATE SHOWING SQUARE SET METHOD OF TIMBERING AT LE ROI MINES —ROSSLAND, B. C.—

SCALE 3/16 IN. = 1 FT.
12 0 1 2 3 4 5

NOTE.—This "Plate" to accompany paper entitled "Line Timbering by the Square Set System," written by BERNARD McDONALD ROSSLAND, B. C.

MINING AND SCIENTIFIC PRESS.

* Read at the meeting of the Canadian Min. Inst., Sept. 10, 1902.

Comstock Lode, and subsequently, in all metalliferous mines elsewhere where the ore bodies exceed a width of 15 feet, the extreme width that is practical to timber by stalling.

The "square set" has undergone numerous modifications of detail in dimensions and the framing of its members in the various camps where it has been since used, owing mainly to local conditions, the dip of the vein and the character of the ore bodies and the enclosing rock.

VEIN CHARACTERISTICS AT ROSSLAND.—In the Rossland mines, the ore deposits have widths ranging up to 100 feet or more, and lengths of several hundred feet along the veins. The veins are sheer zone fissures, the vein filling consisting of country rock, which is now found replaced and cemented to various degrees of completeness by auriferous pyrrhotite and chalcopyrite.

The ore and the enclosing rock may be designated as extremely hard, and the veins dip at angles of about 70°. These conditions facilitate and simplify timbering, without, however, doing away with its necessity.

PRELIMINARY WORK.—In stoping out these deposits the work is begun at the level drives or drifts run in the vein and continued upwards in steps or stopes.

The first work in opening up an ore shoot or deposit preparatory to extraction consists of running drives or drifts through it from the level stations at the shaft, which are generally cut at distances of from 100 to 200 feet in depth below each other. Such drives may happen to be run along either wall of the vein, or through the vein at any point or distance (usually varying) from either wall.

These drives are considered as random holes, made longitudinally through the vein to determine, in a general way, its course or strike, and the behavior and characteristics of the ore shoot. They serve, besides, as preliminary thoroughfares for the traffic, drainage and ventilation necessary for the preparatory work of stoping, to be hereafter described.

As generally run, the drives have widths of about 6 feet, and heights of about 8 feet, and require no timbering, owing to their comparative small size and the hardness of the vein rock.

When it is decided to begin stoping on any new level, the first work done is to excavate the ore along the drives from wall to wall of the vein, making the excavation of sufficient height to receive the "sill floor" set of timbers, as the first series of square sets on the level is called, and to leave a space of 2 or 3 feet over the set. This space serves to provide room for blocking and wedging the timbers to place, and to receive a layer of old timbers, which act as a cushion in preventing the possible breaking of the timbers by the masses of rock that must be blasted down on them as the work of stoping out the ore above proceeds.

SILL FLOOR CONSTRUCTION.—The sill floor is a framework, made of 10x10-inch sawed timbers, laid down on the working level in the ore body; they serve as the sills or foundation timbers on which the square sets are to be erected. It is, therefore, the first, as well as the most important part of the square set system of timbering.

Figure 1, plate 1, shows the sill floor as laid down and ready to receive the "sill floor set" of timbers. The members of the sill floor consist of three pieces, the stringer or long sill, the spreader or short sill, and the hutt spreader or brace. These members, when repeatedly laid in duplicate, will make up a sill floor to any extent required by the size of the deposit.

The dimensions and details of the framing of these members are shown on the plate.

The long sill measures 15 feet over all, and is framed from a 16 foot timber, which allows 6 inches to be cut from either end to square the piece and remove sun cracks.

The short sill, as framed, measures 5 feet 4 inches in length, over all, three of which may be cut from a 16-foot timber, if it overmeasured a few inches, as it generally does, and the ends are sound.

The hutt sill or brace is framed of varying lengths, to suit the existing space, which generally varies owing to local bulgings or contractions of the vein. It is framed on one end exactly like the short sill, while the other is cut square or beveled to fit or hutt against the wall rock, from which it is wedged tightly to place against the long sills.

A description of the method of framing the sill floor set of timbers is not needed, as it will be fully comprehended by a glance at the figures on the plate.

In laying the sill floor the long sills are set ends abutting flush against each other and as nearly as possible parallel with the general strike of the vein, ignoring any local bulging of the walls.

The first sill is laid close and approximately parallel to the foot wall, in which position it is leveled and held by blocking or hutt braces; the other long sills are laid paralleling this one at proper distances apart, that is, 5 feet 4 inches between centers. The cross sills fit on top of these, lying level with them, the ends being halved in framing to rest into similar halvings in the long sills, and to abutt flush against each other and extend endwise from wall to wall of the vein.

When the long sills reach as near the hanging wall

of the vein as desirable they are braced from it by the hutt spreaders or by blocking wedged tightly to bring all the members into proper position. The philosophy of this design of the sill floor is as follows:

The long sill is made 15 feet in length, so as to better sustain the superstructure of square sets erected on it when the ore upon which it rests comes to be stoped away. For instance, when the ore is being blasted from under the sill floor by the work of stoping, coming from the level below, and the blasting tears away a portion of the ore upon which the sill floor rests, making an opening, as it generally does, of, say, 8x8 feet, the long sills would overreach such opening, and one or both ends would rest on the solid rock beyond. Nor would the short sills drop away through such opening, owing to the fact that they rest on top of the long sills, as previously described and shown on the plate.

Through the opening thus made in the ore, the portion of the sill floor exposed would be supported by posts set on the timber sets in the stope below. Thus the long sill operates to allow the work of stoping out the ore upon which the sill floor rests to be safely conducted if such portions of the sill floor as become exposed as the work proceeds are properly supported by posts from the timber work underneath.

TIMBERS AND METHODS USED AFTER SILL FLOOR IS LAID.—The first tier of square sets erected on the sill floor is known as the "sill floor sets." The assemblage of the framed timbers into square sets then proceeds upwards, by floors, set over set, vertically, *pari passu* as the work of stoping exhausts the vein. The timber structure over any level is referred to in subdivisions as the "sill floor sets," "first floor sets," "second floor sets," and so on until it reaches the level above and catches up and supports the sill floor on that level.

This method of reference to the timbering as it advances carries with it the data for a general calculation of the portion of the vein exhausted over a level, as each set of timbers in place indicates that 9 feet vertically and 5½ feet horizontally of the vein is exhausted, 9 feet being the hare height and 5½ feet the width of space required for a set of timbers. Each square set in place indicates that twenty-four tons of vein has been extracted.

Aside from the sill floor, all the timbers employed in the square set system, except the planks for floorings and chutes, are framed from round logs. These logs are preferably of red fir, it being the strongest native timber, but pine, spruce and tamarack may be used. When cut in the woods, the logs are peeled and allowed to season for a period of from six to twelve months, during which time they lose about one-third of their green weight, which is a very important advantage in subsequent handling. In diameter they range from 12 to 20 inches, but generally average about 16 inches, and are sawed in lengths of 16 feet 6 inches.

The logs may be framed by hand or with machine saws into the various members of the square set, as follows, viz: posts, caps, girts or braces, and hutt caps. Like the members of the sill floor, these members may be duplicated to any extent required by the size of the excavation to be timbered.

The posts as framed are 8 feet 2 inches over all; the caps are 5 feet 4 inches, and the girts or braces are 5 feet; the hutt caps, like the hutt spreaders, of the sill floor are cut in varying lengths to suit such spaces as may exist.

The details of framing the logs into members of the square set are plainly shown in figures on plate 1, and need no further description. The philosophy of this method of framing the timbers is that the cap pieces of the various sets form continuous stringers of timber running horizontally from wall to wall of the vein, no matter what this distance may be. Such stringers offer the end grain or greatest strength of the timbers to the walls, from which the greatest strains are generated.

The posts and girts rigidly support the stringers thus formed of the several cap pieces in true horizontal position, bearing on the joints from right-angled directions, while the cap pieces and the girts support the posts in true vertical position.

The whole framework forms a strong rigid structure capable of indefinite extension upwards and longitudinally as stoping proceeds, allowing at the same time for any expansion and contraction in width to suit such irregular widths of the vein as may occur.

Besides the function of the various members of the square set system to support each other in the manner described, that of the cap pieces is to receive directly and sustain the strains coming from the walls of the exhausted deposit, while that of the posts is to support the vertical weight coming from the undercut ore deposit and the broken ore lying on the floors, but strains coming from any direction are distributed over all the members of the set.

The system possesses, to a considerable degree, the qualities of a truss, and makes it possible to extract all the ore of any deposit and effectually secure the enclosing walls from caving in. When the framework comprising the sets is erected, a floor, consisting of 3-inch plank, is spiked down on the caps of each floor set. These are the working floors on which the miners operate the machine drills, in the method shown on Fig. 5. When the ore is dislodged from the vein by blasting, it falls on these floors, where the waste or second-class ore may be sorted

out from the shipping ore. The shipping ore is shovelled into chutes, which are built of 4-inch plank spiked to the timber framework and carried upwards with the square sets, as shown in the plate. The second-class ore, or waste sorted out, may be stored temporarily or permanently in the framework of the timbering, from whence it may be drawn off at any time through chutes, should removal elsewhere be desired.

Figs. 4 and 5 are ideal cross and longitudinal sections illustrating the method of timbering and the work of stoping as it is carried on between the levels. Fig. 4 is a cross-section through the line A-B on Fig. 5, which in turn represents the longitudinal section through the line C-D on Fig. 4. On Fig. 4, the original position of the level drive in the vein is assumed as shown at the point X. This drive, as already stated, furnishes the point from which the excavation of the vein matter for the sill floor is commenced.

The step method of excavating the ore is shown on Fig. 5, where stoping is proceeding in double-headed steps, each step excavating the ore from wall to wall and having a vertical height of 9 feet in the clear, which allows the erection of one floor of timber sets, which in turn provides the scaffolding from which the miners may attack the ore above.

In stoping out the ore on any level, the ordinary method is to keep the sill floor at least 30 feet in advance of the first floor, and it about 30 feet in advance of the second, and so on, as is shown in Fig. 5. One machine drill, or generally two, in case the vein is wide, are assigned to the work of the two opposite headings of any floor, going in opposite directions, working on each heading alternately. When one face is drilled and blasted, the machine drills are changed to the opposite face, and the shovellers pass the broken rock into the chutes, or sort it, if sorting is required. When the ore broken is thus removed from the face, the timber gang erects another unit of timber there, and the stope is again in readiness for the machine drills, which have by this time finished drilling on the opposite face.

Generally, the step method of stoping proceeds in opposite directions from a raise, run through the ore body between the levels, as shown in Fig. 4. The framed timbers are delivered in the stope by dropping them down through this raise or hoisting them from the level. Sometimes the framed ends of the timbers are injured by dropping them through the raise, but, as a rule, no material injury is done to them, while the time gained by this method is a very important factor in cheapening the cost of timbering, compared with hoisting piece by piece from the sill floors underneath.

PER TONNAGE COST OF SQUARE SET TIMBERING.—After the sill floor is laid and the framework started, a square set, which is made up of one post, one cap and the brace, consumes 18½ running feet of logs.

The logs, peeled and seasoned, cut measuring 16 feet 6 inches, cost \$1.20 each delivered f. o. b. the cars at the works, or about 8 cents per running foot. Therefore, the 18 feet 6 inches required for the set would cost \$1.48, or, say, \$1.50 unloaded, in the framing shed, provided the logs are not cut to waste in framing, which may be avoided with a little care and foresight.

The cost of framing the pieces comprising the set would be about \$0.55 per set, when framed by hand labor, carpenters being paid \$3.50 per day of nine hours.

COST DATA PER SQUARE SET, HAND FRAMED.—**MATERIAL.**—A log measuring 16 feet 6 inches, costing \$1.20, cuts into two posts, or three caps, or three braces; therefore:

Material in one post costs.....	\$0 65
Material in one cap costs.....	43
Material in one brace costs.....	40

Total cost of material in one set is, say.....\$1 50

LABOR. —One carpenter frames per day:	
About 21 posts, costing each.....	\$0 167
About 21 caps, costing each.....	167
About 16 braces, costing each.....	219

Total cost of framing.....\$0 553

Total cost of labor and material in set.....\$2 053

The details of cost of the individual members of the set, framed on the surface ready to go into the mine, are, therefore, as follows:

One post costs for.....	{ Material.....\$0 650	\$0 817
	{ Labor.....167	
One cap costs for.....	{ Material.....430	649
	{ Labor.....219	
One brace costs for.....	{ Material.....400	587
	{ Labor.....187	

Making the total cost.....\$2 053

The costs next attaching to the square set, or unit, of this method of timbering are:

Lowering into the mine, approximately.....	\$0 10
Delivering to place required, approximately.....	0 10
Labor in erecting, approximately.....	1 50
Incidental material, such as blacks, wedges, tools, nails, approximately.....	0 10
Cost of sill floor, averaged over eleven sets between levels 100 feet apart, approximately.....	0 15

Total.....\$1 95

These costs, last above given, may vary greatly,

being increased or decreased with the completeness of the facilities for handling the framed timbers, the cost of the several items as stated may vary accordingly from time to time, but the total will be about the average cost, and will closely approximate that of carefully supervised operations. Therefore, from the foregoing, it will be seen that the cost of the square set placed in the mine will come down, as follows:

Total cost of labor and material, as above.....\$2 053
Labor and material when set is in place, as above. 1 950

Total cost, say.....\$4 003

When framed by machine saws, the cost of framing a square set does not exceed 30 cents, including the cost of power, as against 55 cents by hand—a difference of 25 cents per set. Therefore, if the framing is done by machinery, the cost of a set in place would be \$3.75 as against \$4, as shown above, when the framing is done by hand work.

The per tonnage cost for timbering by this method works out as follows: The average space to be excavated for each square set is 5.3 feet wide by 5 feet long by 9 feet in height, or 240 cubic feet. The Rossland ores, being heavily impregnated with iron and copper pyrites, yield a ton of 2000 pounds for each 10 cubic feet of ore in place. Therefore, from the 240 cubic feet of vein required to be excavated for a set of timbers, the yield will be twenty-four tons. If the timbers were framed by hand, the cost of timbering, so far as described, would be about \$0.17 per ton; if by machinery, \$0.156—a difference of \$0.014 per ton in favor of the machine-framed sets.

In addition to the costs above tabulated, there still remain the costs of the chutes, floors, ladders and railings necessary for the convenience and safety of the miners and passage of ore and supplies. These require, on an average, about 100 feet of lumber, board measure, per square set, which, at \$11 per 1000 feet, would add for the lumber \$1.10, and for placing it say \$0.10, or a total of \$1.20 to each square set, which would then cost, in the case of hand framing, \$5.20, or a total cost of \$0.216 per ton of crude ore; and, in the case of machine framing, \$4.95, or a total cost of \$0.206 per ton of crude ore.

INCIDENTAL COSTS.—The cost of timbering, per ton of ore shipped, would be greater than the figures given above in proportion to the quantity of waste or second-class ore that would be sorted out from the crude ore extracted.

In the Rossland mines about 20% of the ore mined is sorted out and goes to the second-class ore dump to await profitable treatment, expected to come in the future. Deducting 20% of the 24 tons of crude ore in a square set, there would remain 19.20 tons as the shipping ore, against which the total costs of the square set, as above—\$5.20 or \$4.95, as the case might be—would have to be charged. This would raise the per tonnage costs on the ore shipped to about \$0.27 and \$0.26, respectively.

Where there is a reasonable expectation that the second-class ore will eventually pay a profit after suitable treatment, it would only be fair to charge a pro rated cost of the timbering to it, and the cost would then remain \$0.206 and \$0.216 per ton, as above.

In cases where, on account of bad ground, angle bracing, bulkheading or cribbing and filling would be required, the per tonnage cost would be still further increased, but to a comparatively small extent.

LIMITATIONS OF THE SQUARE SET.—The limit of the capacity of the square set system as already described, without any re-enforcing devices to withstand the pressure that may be exerted on it by the enclosing walls of an ore body when that ore body is extracted, may be reached.

The limit depends on the nature of the walls enclosing the deposit and the extent of the excavation. If the wall rocks are solid and do not swell on exposure to the air, and dip at a high angle, the ore body may be extracted between levels say 100 feet apart and for a length of 200 or 300 feet along the vein, and the pressure likely to be exerted by the walls will be sustained by the skeleton square set without reinforcement of any kind.

If, however, the vein dips at a low angle and the wall rocks are decomposed, or of a talcose or serpentine character and disposed to swell, the pressure that might be exerted on the timbers, when even a comparatively small excavation of the ore body has been made, may cause them to crush, "jack-knife" or collapse, allowing the wall rocks to cave in and close up the stope. When the members of the square set become squeezed out of the truly right-angled position which they should occupy, their capacity to resist wall pressure or strains from any direction is practically nil.

When, owing to wall pressure or imperfect erection of the sets, "jack-knifing" of the square sets results, the cave-in, which sooner or later will follow, with disastrous consequences, may be prevented by either bulkheading, cribbing or filling the skeleton framework of the timbers.

The cost of the foregoing methods of reinforcement which are the only practical ones that can be successfully used in bad ground, cannot be given with any general degree of accuracy, as that is so much affected by the local conditions in each case.

A general idea of what the cost is likely to be

may be gleaned from the description following:

REINFORCEMENT METHODS—ANGLE BRACING.—If, after the square sets are properly erected in place, the members manifest an inclination to swing out of the right-angled positions they originally occupied to each other, this tendency may be arrested and prevented by a system of angle bracing. This consists of placing diagonal braces made of round or square timber on the sill floor and against the foot of the posts and leaning the heads so they will fit snugly against the top of the posts underneath the caps or girts, as the case may be, of the next adjacent set. The head of this diagonal brace should lean in the direction from which the pressure comes. This method is illustrated in Figure 8.

CRIBBING.—When the square sets manifest a stronger tendency to swing than in the case above referred to, the collapse threatened may be prevented by crih work. This consists of crossing alternate layers of round or square timbers of any convenient size between the posts of the sets until the space between the sill and cap is filled, as shown in Figure 9. This crih work may extend from wall to wall through two or more rows of sets if required, and the spaces between the sets thus cribbed may be filled with waste rock, but this is called "filling," and will be referred to under that heading below.

BULKHEADING.—This method of reinforcement consists of placing timbers closely together in much the same way as the crih work above referred to, and wedging them tightly between cap and sill.

FILLING.—This method consists of filling the spaces between the members of the square set with any material such as waste rock, earth or sand. When the filling is done it is retained within proper bounds and the necessary passageways are kept open through the timbers by building crih work around them as described.

Waste rock for "filling" purposes is generally secured from the development or dead work that is being prosecuted in other sections of the mine, but where a large quantity is required it is often found necessary to mine it specially for that purpose, or drawn from the waste dumps on the surface. About 8 cubic yards of material is required to fill the vacant space of the frame of a square set, and the cost of such filling will be the cost of obtaining and placing such material, together with the crih work required to retain it within proper bounds.

GENERAL REMARKS.—The square set system of timbering is used successfully and exclusively in all mines where large deposits of metalliferous ores occur.

Where favorable conditions, such as railway transportation and a moderate supply of timber, exist, it is comparatively cheap. If care is taken in the construction of this system in the mine, it ensures that all the ore existing may be extracted without injury to the workmen or the mine. Round logs or sawed timbers of any dimension, ranging from 8" upward, may be used, but the sizes are governed by the economic conditions and the mining requirements.

In the mines of Rossland the round logs or timbers used for the square sets cost \$1.20 for each log 16.5 feet in length f. o. b. the framing shed at the mine. These logs are cut in the State of Washington and delivered over the Spokane Falls & Northern Railway on flat cars, over distances ranging from 45 to 75 miles, each flat car being loaded on an average with sixty logs. The unloading at the framing shed is done in a few minutes by cutting off the retaining standards on the flat cars and allowing the logs to roll off on the storage platform.

Of course, where wagon transportation is required from the railway terminus the expense will be correspondingly increased.

In every mining camp there will be more or less variation in the method of framing and in the cost of the square sets in place, also the tonnage of ore to be extracted from the space occupied by each square set.

Where the dip of the vein is at a flat angle, or the walls are had, shorter posts than those described herein will probably be more advantageous; the more vertical the dip of the ore deposit the longer the posts may be, and vice versa.

Where sawed lumber is comparatively cheap, 3-inch plank is preferable to lagging poles for floors, on account of the greater floors it offers for shoveling, and the fact that it may be removed and reused.

Production of Borax.

The report on "The Production of Borax in the United States," by Dr. Joseph Struthers, in "Mineral Resources of the United States, 1901," now in press, U. S. Geological Survey, shows that there was a slight decrease in 1901, the output being 17,887 short tons of crude borax and 5344 short tons of refined borax, valued at \$1,012,118, as compared with the production of 24,235 short tons of crude borax and 1602 short tons of refined borax in 1900. Of the output in 1901, California produced the whole of the refined borax and 16,887 tons of the crude borax.

The production of borax in the United States continues to be derived mainly from the colemanite deposits of California, although a small quantity is pro-

duced from the marsh deposits of California, Nevada and Oregon.

The imports of borax, borates and horic acid in the United States amounted to \$56,683, as compared with \$32,679 in 1900 and with \$27,047 in 1899.

The Borax Consolidated, Ltd., (the international borax combination), now operating in the United States, England, France and South America, reports a very favorable business for the fiscal year ending Sept. 30, 1901. This company is capitalized at \$1,400,000, of which \$800,000 is preferred stock carrying 5% accumulative dividends, and \$600,000 is ordinary stock, each of the par value of \$10. The net profits for the fiscal year were \$190,278, from which interim dividends of \$22,000 on preferred stock and \$30,000 on ordinary stock were paid.

There has been but little fluctuation in the price of borax during 1901, which remains at 7 to 7.25 cents for the refined and 6.75 to 7 cents for the concentrated product.

When Ice Ran Up Hill.

A scientific discovery of great interest to geologists and of practical value to mining men has been made by Prof. Atwood of the University of Chicago, who, with a party of students, is spending the summer examining the formations of the Uinta mountains of Utah. It clears up the mystery often encountered of the presence of small pockets of gold-bearing ores far removed from the main ore body.

Prof. Atwood's discovery, in brief, is that the watersheds of the present period are not identical with the icebeds of the glacial epoch, and that occasionally the great glacier of 10,000 years ago or so moved up hill with quite as much facility as it coasted down the canyons, carrying with it over the divides large hodies of debris scraped up in its path, which assisted in forming the moraines when the glacier melted.

Prof. Atwood's discovery was made in a rather peculiar manner. In the vicinity of Mount Watson, near the headwaters of the Weher river, are abundant evidences in the shape of small lakes, moraines, etc., of the presence of the great glacier at an earlier period. One side of the mountain is barren rock, scraped clean by the moving body of ice. Upon this barren surface are the scratches and indentations of the rocks carried by the glacier in its course. While examining these grooves a few days ago Prof. Atwood was startled to discover that they ran up hill instead of down. The evidence of this was fragments of rocks pulverized by the great weight and strewn along the path.

Excited by this peculiarity, the professor called his companions and they spent several hours tracing the indentations up the mountain side, and every step confirmed the theory advanced by the instructor. Prof. Atwood will publish the result of his discovery in a scientific journal. His explanation of the peculiar phenomenon is that the glacial body, gradually pushed over the divide, did not, as might have been expected, break and melt where it was, but when the ice body receded was drawn up the mountain side and back over the other side of the divide. As it moved, of course, it picked up in its path portions of the ground beneath, which became a part of the moraine when the ice melted.

The discovery may lead to a revolution in the method of prospecting. The miner who finds a detached body of gold-bearing ore will hereafter not be content with seeking the mother lode in the same canyon, but will look also on the other side of the divide, from which the detached fragment may have been drawn by the glacier. To geologists the discovery is full of interest as shedding light on the movements of great ice bodies.—Salt Lake Tribune.

Finder of Large Nugget Dead.

Samuel Hawkins Napier, who found what is said to have been the largest nugget of gold ever mined, is dead, says a Provincetown, Mass., dispatch to the New York Times. He died alone, except for the companionship of a faithful dog, 200 miles from any human habitation, in the wilds of the Gatheneau river, Canada.

He was a Canadian, born in New Brunswick. He was the discoverer of the largest gold nugget ever found in the world, the famous "Welcome Nugget," found in the Ballarat camp by Mr. Napier and his partners, who went from Canada to Australia at the time of the Australian gold excitement in 1852.

The nugget weighed 2195 ounces, nearly 183 pounds, and contained only a small quantity of gangue. The nugget was placed on exhibition at the first Crystal Palace Exposition in 1853, and the owners took in thousands of pounds from curious sightseers. After the exposition the nugget was bought by the Bank of England for £8376 10s. 6d.

At the time the big nugget was found the Ballarat district was overrun by bushrangers and Napier and his partners did not dare let a hint drop of their phenomenal good fortune. They hurried the big lump of gold in their tent and proceeded in their diggings as usual. Later, after declaring that their claim was valueless, the men packed up the big nugget in a bullock cart and made for the coast, where they took ship for England.

Some Useful Formulas.*

[HYDRAULIC HEAD: $P = 0.434 H$]

Water pressure is usually not so easily understood as steam or air pressure. The two sorts of pressure may affect the gauge the same way, but their causes and nature are different. The reason is found in the fact that water and steam have different physical properties. Steam is compressible, water is incompressible. Steam exerts pressure because it is compressed and confined within a limited space; water exerts pressure because of its own weight, or because of the weight or force of some outside agency acting upon it. Gases and vapors differ from liquids in that they are elastic and are always seeking to expand against any force holding them in confinement. The small particles or molecules of which the gas is composed seem to repel each other—they have a tendency to remain as far apart as possible—while in a liquid the tendency seems to be directly the opposite; that is, the molecules attract each other and remain as close together as possible. That is the reason why a liquid cannot be compressed while a gas can be, and that is why a liquid exerts no expansive pressure while a gas does.

All gases may be changed to liquids by cold and pressure. This statement was formerly only a theory, not actually demonstrated. In just the same way that cold and pressure change a gas into a liquid, so heat and the absence of pressure change a liquid into a gas. Just what goes on when heat is applied to a liquid—say water, for example—no one can say. We know that the heat is absorbed and the water turns to steam. We say that the heat has become latent, which means that it has ceased to be heat in its usual form, and has become some other kind of energy which has given to the molecules of the water a certain activity causing them to repel each other, giving rise to the force of expansion. This tendency to expand causes pressure when we confine the steam in a limited space.

The pressure of water is very different. Since it cannot be compressed, it cannot exert any expansive force. Its pressure is due to the force of gravity or to some external mechanical force acting upon it when confined, as, for example, the plunger of a pump or the ram of a hydraulic press or accumulator. Disregarding for the moment these latter

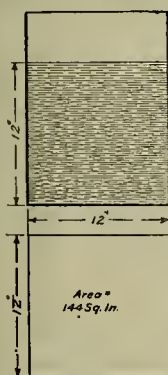


FIG. 1.

mechanical causes, let us consider the natural cause of water pressure and the laws of its action. In Fig. 1 we have a vessel nearly full of water. We will say that the base of the vessel is just 1 square foot in area and that the water stands 1 foot high. Then we have 1 cubic foot of water, weighing about 62½ pounds. It is easy to see that the total pressure at the bottom of the vessel is 62½ pounds, which is equal to $\frac{62\frac{1}{2}}{144} = 0.434$ pound per square inch. In Fig. 2 we have a vessel of another form, the area of whose base is still 1 square foot, but the area at the top is only about half as much. The water stands 1 foot high, as before, but there is less than 1 cubic foot of water. We will say that the vessel is so much cut away at the top that only $\frac{1}{2}$ of a cubic foot, or 41.7 pounds, of water is present. The total pressure on the bottom will be the same as in Fig. 1, despite the fact that there is only two-thirds as much water present. This pressure will be 62½ pounds, or 0.434 pound per square inch, as before. The pressure within the dotted area is 0.434 pound per square inch because a column of water 1 inch square and 1 foot high rests on each square inch of this space. Outside of the dotted area is a column of water 1 inch square and 6 inches high above every square inch of the bottom. The pressure due to the weight of this column is 0.217 pound per square inch, or one-half of 0.434. The top of each of the columns is pressing against the top of the vessel. To prove this, make a small hole and the water will spurt out; or, if you insert a little tube, as at A, the water will "seek its own level." Then the pressure on this top partition is due to the height of the water in the open part of the vessel, and since this is 6 inches high the effect is the same as if the sides of the vessel were straight and the water stood 1 foot high, as in Fig. 1. That is to say, the pressure on the top is 0.217 pound per square inch, and this pressure is balanced by an equal pressure at the bottom, i. e., if the water presses upward against the top partition,

it must also press downward with the same force directly under the partition.

To this must be added the actual weight of the water, or 0.217 pound per square inch, making the total pressure 0.434 pound per square inch outside of the dotted area as well as within.

We started out by saying that water pressure is due to the weight of the water, and in a general way this is true, but the foregoing illustration should make it plain that something else besides weight must be considered, namely, height. It is not the quantity of water present that determines the pressure. The pressure is the same in both Fig. 1 and Fig. 2, although there is less water in the second case than in the first. But the height of the water is the same in each case, and therefore the pressure is the same. Take Fig. 3, for example. Here we have, say, one-tenth as much water as in Fig. 1, and yet the pressure on the bottom is the same as before, namely, 62½ pounds, or 0.434 pound to the square inch.

We cannot fix it too firmly in our minds that it is the height of the water level which determines the pressure upon any submerged surface. It would, perhaps, be more correct to say that the pressure upon any submerged surface depends upon two things, namely, the weight of the liquid and the height of the free surface. We must rid our minds of the idea that the quantity of liquid present has anything to do with it. This is sometimes called the "hydrostatic paradox."

The height of the free surface of the water, or the water level, is called the hydraulic or hydrostatic head, and the pressure due to the head is computed by the simple formula, $p = 0.434 h$ or $h = 2.3 p$, in which p equals pressure in pounds per square inch, and h equals the head in feet, that is, the vertical height of the free water surface above the submerged surface in question. We have already demonstrated the truth of the formula when we showed that with the water level 1 foot high the pressure was 0.434 pound per square inch, whatever the shape of the vessel or the quantity of water present.

The same principle applies to all liquids, but the numerical values in the formula depend upon the weight of the liquid, and are given above only for water. They would be different for any other liquid. For instance, for mercury the formula would be $p = 5.9 h$, or $h = 0.0169 p$, and, for olive oil, $p = 0.399 h$, or $h = 2.51 p$.

Since a mercury column is commonly used to measure small pressures, a few words on this subject in passing will not be out of place. The weight of the atmosphere at sea level is about 14.7 pounds per square inch, and this pressure will balance a column of mercury very nearly 30 inches high. For ordinary engineering work it is enough to say that a pressure of 15 pounds supports 30 inches of mercury. Then 2 inches represents 1 pound and $\frac{1}{2}$ of an inch represents 1 ounce. Fig. 4 illustrates a crude apparatus which any one can make in an hour, and which the writer has used in experimental work to advantage. Occasion has frequently arisen in experimental work on tests of one sort or another to measure pressures or differences of pressure which the ordinary steam gauge will not record with any accuracy, and for which the indicator cannot be well applied. This little mercury gauge has given excellent results in such cases, since it indicates pressures as small as 1 ounce, and since it will measure vacuums as well as pressures.

Any engineer can make one for himself by securing a piece of glass tubing, about $\frac{1}{4}$ inch outside diameter and $\frac{1}{8}$ inch or so inside diameter, at a chemical supply house. The tube should be 4 or 5 feet long, so that each leg will be 25 or 30 inches long when bent. To bend, hold the tube in an ordinary gas pipe. Heat slowly and bend gradually, so as not to flatten the tube. The U tube should now be mounted upon a board upon which has been marked off a scale reading in inches and eighths of inches. Pour in mercury until each leg is half full. For measuring a pressure, connect one leg with the vessel under pressure by means of a rubber tube. A pressure will cause a difference in levels one way, a vacuum the other way, as will be readily understood. In reading remember that it is $\frac{1}{2}$ inch to the ounce. For measuring differences of pressure, connect one pressure to one side and one to the other.

So far we have considered only the pressure on the bottom of a vessel. What about the pressure on the sides? We can best answer this by stating a general rule, which is as follows: The pressure on any

submerged surface is equal to the area of the surface in square inches multiplied by the pressure per square inch at its center of gravity, which for a plane figure will be its geometrical center; and the pressure at the center is, of course, determined by our formula, $p = 0.434 h$. Remember this rule, and you can figure the hydrostatic pressure on any surface, no matter what its shape, size or location. Take an example for illustration:

What is the total pressure on the surface A in Fig. 5, assuming it to be 3 feet square? Solution:

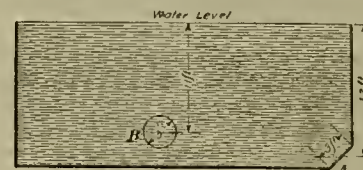


FIG. 5.

$$\begin{aligned} h &= 12'; \\ p &= 0.424 \times 12 = 5.208; \\ \text{Area} &= 3 \times 3 = 9; \\ 9 \times 5.208 &= 46.872 \text{ pounds. Ans.} \end{aligned}$$

Find the total pressure on the sphere B, Fig. 5. Solution:

$$\begin{aligned} h &= 11; \\ p &= 11 \times 0.434 = 4.774; \\ \text{Area} &= \pi D^2 = 3.142 \times 9 = 28.278; \\ 28.278 \times 4.774 &= 134.89 \text{ pounds. Ans.} \end{aligned}$$

As previously stated, hydrostatic pressure may result from some mechanical force acting upon water in a confined space, as, for example, by pumping. It should be borne in mind that water always has a pressure due to its own head, irrespective of any outside pressure imposed upon it. It will be sufficient to say that this outside pressure is transmitted undiminished throughout the whole system. It must be corrected, however, by adding to it the pressure due to the hydrostatic head at any point to find the total effective pressure at that point.—J. Lewis in Science and Industry.

Protection of Wire Ropes.

Widely different uses of operative wire ropes present a problem for exterior protection to answer the wide range of requirements. A dry atmosphere, tending to speedy oxidation and brittleness, and consequent sloughing off of coating, presents itself in one location, while at another a moist atmosphere, or possibly an almost continuous subjection to water, sometimes impregnated with acid, prevails. Many exposed wire ropes are subjected to the extremes of summer and winter. The illustration herewith presented shows application of a special coating termed Wire Rope Shield, which the manufacturers say possesses the requisites of a satisfactory coating in being tenacious, pliable, lubricating, waterproof and free from destructive acid. The high points of the strands are protected from abrasion by a lubricating film deposit, and a like deposit prevents chafing of the wires, the rope being completely sealed to resist acid, atmospheric, gaseous, sulphurous or water attacks. The use of this shield on wire ropes from an office building to extremely wet mines, strongly impregnated with acid, and to dredging machinery, constantly subjected to water, would test its efficiency. The illustration also shows an interior material termed Wire Rope Filler, a flexible, cushioned lubricant, to protect from abrasive wear and effectually seals against water soaking, acid or gaseous attacks incorporated in the manufacture of wire ropes. The Ironsides Co., Columbus, Ohio, manufacture these materials.

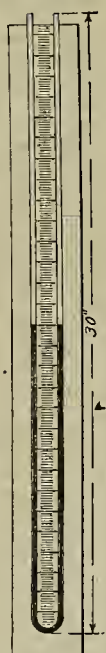
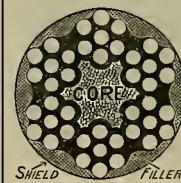


FIG. 4.

Prospecting for Oil.

WASHINGTON, D. C., Aug. 26.

SIR: For your information and guidance in regard to the rights of miners and others prospecting for oil, you are informed as follows:

First.—The right to prospect is accorded to citizens of the United States and those who have declared their intention to become such.

Second.—A prospector has no oil claim to any land until oil has actually been discovered thereon. The mere seepage of a little scum of oil on waters coming out of the ground in the vicinity or on the land does not constitute such discovery.

Third.—Actual prospecting for oil or developing of an oil mine can not be done by building houses, camps or trails and roads, and the extensive cutting of timber for such alleged prospecting and development must not be tolerated. Legitimate prospecting for oil consists in actual boring with proper equipment, and where such legitimate prospecting is done, prospectors should be accorded the privilege of cutting the necessary timber therefor.

W. A. RICHARDS,
Acting Commissioner General Land Office.

Metallurgical Practice at the Greenwood Smelter.*

By PAUL JOHNSON, E. M.

The B. C. Copper Co.'s smelter commenced operations on Feb. 18, 1901, with one blast furnace, 42x150 inches at tuyeres. This was kept in blast until Aug. 22, when it was shut down nine days for repairs, and started up again on Aug. 31, since when it has been continuously in blast. During the time from Feb. 18 to Dec. 31, 1901, in this one furnace, 117,077 tons of ore were smelted and 3714 tons of matte, assaying from 45% to 60% in copper, from two to six ounces in gold and from ten to thirty ounces in silver were produced. Besides Mother Lode and Boundary ores, there have been smelted some gold quartz ores of 80% to 90% silica, utilizing the basic character of the Mother Lode ore. The largest tonnage was put through during the month of December, when 13,098 tons of ore were smelted, thus averaging for the entire month, for every twenty-four hours, 422½ tons of ore. The largest tonnage smelted in one single day was on Jan. 10, 1902, when the furnace put through 459 tons of ore. To handle this amount of material, and to break up and pile the matte produced—the work of the blast furnace proper—in twenty-four hours, twenty-nine men were employed, viz.: six charge wheelers, four coke wheelers, nine feeders (on eight-hour shifts), two charge weighers, two furnace men, two matte tappers, two roustabouts and two foremen; thus, during December 14½ tons of ore were handled per man per day. Counting the total force of the smelter, the sample mill requires ten men for unloading and crushing ore, sampling and distributing same into ore mixtures, and loading the shipping matte, engineers, foremen, one blacksmith with a helper, one carpenter, besides eight more men, making the total number of men employed, including foremen, forty-seven, which, at 422.5 tons of ore put through daily, makes nine tons of ore handled and smelted for every man employed—which I believe is a record.

As for the character of the Mother Lode ore, it may be classified into limy, irony and sulphur ores, and it is desirable for the smelting to have reserves of these different kinds to help out at times, when in the daily tonnage from the mine too much of one or the other sort is on hand. I give below the assay and analysis of three large lots of these different ores:

- Sample of irony ore from 1000 tons lot.
- Sample of limy ore from 1600 tons lot.
- Sample of sulphur ore from 120 tons lot.

	a. Irony.	b. Limy.	c. Sulphur.
Copper.....	2.8%	2.2%	2.7%
Gold.....	0.11 ozs.	0.09 ozs.	0.15 ozs.
Silver.....	0.58 ozs.	0.43 ozs.	0.15 ozs.
Insoluble.....	28.7%	35.2%	29.8%
Fused Silica.....	16.9%	29.2%	24.5%
Iron.....	32.7%	14.7%	17.5%
Lime.....	5.6%	19.8%	16.0%
Sulphur.....	3.7%	5.3%	13.7%

The character of these ores is not only self-fluxing, but at times rather basic. I have, therefore, sometimes smelted to advantage as much as 5% to 6% of straight quartz ores with them.

Before starting up the furnace, I had my doubts whether I could make higher grade matte than 30% to 35% copper, without resorting to roasting the ore, but I found by actual practice, what I had hoped, that the irony variety, which is magnetic oxide of iron (Fe_3O_4), in smelting and reducing its iron to Fe_2O_3 for the slag, gives off one atom of oxygen for every molecule of Fe_3O_4 , and this oxygen acts as a powerful desulphurizer, so that I have, in fact, burned off as much as 85% to 90% of the sulphur in the charge at times. I have aimed at making a 45% to 50% copper matte, but sometimes it has come out as high as over 60% copper, through having had rather much of the irony in the charge. I may mention, in connection with making this high grade of copper matte, an interesting fact, viz.: that whenever the matte begins to come up to 53% copper and above, the gold will "lock up" in the furnace in the metallic copper bottoms which form. One week, when making 58% to 63% copper matte, I had gold locked up to the value of \$6000 in the furnace bottom; the next week I had sulphur ores with which I could get the matte down to 45% copper, and I then got all the gold out in five days. Silver does not behave in this way.

The Mother Lode ore is exceptionally free from arsenic and antimony and behaves quite differently to certain other British Columbia ores which carry quite an amount of these metals, and in running which I have found metallic copper and speiss separate out as soon as the matte came up to 47%, causing much trouble in filling up the tap-hole, and threatening in this way to plug up the furnace. To obviate this I have found it necessary, elsewhere, to change the trapped spot to the ordinary way of stopping up the tap-hole with clay, and when the bottom was rising up inside the tap-jacket I used to blow the furnace for five minutes, and the blast, following through, melted the gathering metallics and speiss. With the

Mother Lode ore, however, I have made as high as 67% copper matte in the blast furnace, using trapped blast, without filling the tap-hole with metallic copper.

For its size (42x150 inches at tuyeres), I think this furnace has the best record so far for large tonnage and, at the same time, cleanness of slags made. The coarseness of the ore has a great deal to do with tonnage, and to some extent clean slags, as was discovered when we began to crush it to a 5-inch size, instead of from 2 to 3 inches, as at first. A couple of per cent of silica, more or less, in the slag does not slacken these big furnaces up as quickly as it does smaller ones; neither is high lime as bad. What I have found troublesome, raising the copper in the slag and making it heavy with a poor separation of the matte, is when the iron of the slag comes up to 30% and 32%, and silica at the same time is low, say, 28% to 30%.

I give below examples of some different kinds of slag made, with the corresponding tonnage:

Nov. 7, 1900.—Slag: $\text{SiO}_2 = 42.7\%$; Fe, 21.1%; CaO = 20%, and Cu 0.33%; matte, 44% Cu; furnace smelted 393 tons of ore.

April 1, 1901.—Slag: $\text{SiO}_2 = 33.8\%$; Fe = 25.4%; CaO = 25.7%, and Cu = 0.25%; matte went 49% Cu; tonnage, 402 tons of ore; high lime has a tendency to make the slag free from Cu.

July 7, 1901.—Slag: $\text{SiO}_2 = 30.9\%$; Fe = 32.5%; CaO = 16.8%; Cu = 0.44%; matte, 53% Cu; tonnage, 399 tons.

Jan. 10, 1902 (when the furnace put through 459 tons of ore).—Slag: $\text{SiO}_2 = 37.8\%$; Fe = 24.5%; CaO = 20.9, and Cu = 0.35%; matte, 49% Cu.

We make slag assays for copper twice a day, but do not make it by the generally adopted colorimetric method, which, as a rule, gives too low results and deceives the metallurgist, making him believe and tell others that he makes cleaner slags than he does. The slag samples are taken every hour, chilled in water, and the day and night shifts kept apart. Two grams are taken for the determination, dissolved in hydronitro-chloric acid and evaporated with H_2SO_4 diluted, and the copper precipitated with hyposulphite of sodium solution; the Cu_2S is dissolved in HNO_3 and titrated with KCy; this determination takes somewhat over two hours, but it is correct and reliable, and it will check, as I have proved, to 0.01% of copper. Where you have very little copper in your charge, it is important to have accurate determinations of your slags and to keep them low in copper, as 0.1 of 1% makes quite an item. These daily slags are then put together, and once weekly an average assay of them all is made for gold, silver and copper. The slags, as a rule, have been very clean, as follows:

Copper, varying between 0.30% and 0.037%.

Gold, varying between 0.0025 and 0.0035 ounces.

Silver, varying between 0.04 and 0.07 ounces.

Of course, more copper in the slag is allowable in making 50% Cu matte than in making 30% Cu matte. Formerly it used to be considered good smelting to have only 0.1% copper in the slag for every 10% copper in the matte; thus, in making 30% Cu matte, 0.3% Cu in the slag was permissible, and so forth.

The amount of coke used is from 11½% to 12% of the weight of the ore. The blast used is from a 7½ Connersville blower, making 155 revolutions per minute and giving 80 cubic feet of air per revolution. The blast furnace averages 1½-inch mercury, equal to fourteen ounces.

The feed height above the tuyeres varies from 4 to 8 feet, when little sulphur of much coarse ore, feeding high, when much sulphur of much fine ore, feeding low. The best feed height for good running I have found to be from 7 to 8 feet.

As to the running of the furnace, charges of three tons are put in at the feed floor by feeders, and not by any mechanical device which, as I have had occasion to find out, do not pay, but cost a good deal of money and give a bad working furnace and dirtier slags.

A charge comes down to the tuyeres in three-quarters of an hour. Slag and matte run together continuously through a trapped spout into a water-jacketed forehearth on wheels, inside dimensions being 8 feet long by 5½ feet wide by 3 feet deep. The matte, having a specific gravity of 5 to 5.3, sinks to the bottom, and the slag of a specific gravity of about 3.4 to 3.5, overflows at the farthest end into a large settling pot, and from this into the granulating flume. The matte is tapped at intervals into matte pots, the contents of which are poured into matte molds 2 feet wide by 5 feet long by 4 inches deep, thus cooling off the matte quickly, and delivering it in the shape of cakes 1 to 1½ inch thick. These matte cakes, when cooled, are knocked down on the top with sledge hammers and broken up into 3-inch to 5-inch pieces and shipped this way in bulk into box cars, the lots averaging thirty tons. This does away with a crusher and sacking and makes the matte pots last longer.

ENLARGEMENT OF THE PLANT.—We have during the latter part of 1901 been at work to double the capacity of the smelter, and to this end erected new sets of lower ore bins, twelve in number, with an increased storage capacity of 5000 tons, making a total storage capacity for the lower ore bins of 10,000 tons. Another 560 feet long railroad trestle has been built between the two previous ones in order to facilitate

and make possible the handling of over 1000 tons daily of material for the smelter by the railroad. The foundations for the furnace building extension and the new second furnace are in, and cast iron columns and deck plates for the new second furnace have been put up. The furnace will be finished as soon as the weather allows the putting up of the brick-work for it. The new 7½ Connersville blower is ready and in place for the furnace. With this second furnace, which is now completed, the plant has a daily capacity of over 800 tons of ore, and, together with coke, coal and matte, the railroad will have to handle nearly 1000 tons daily.

We figure on getting eventually three to four furnaces going, and shall then add converter works for making the matte into blister copper.

The Chlorination Process.

In the chlorination process the chemicals required are sulphuric acid, chloride of lime, sulphide of iron and sulphur. Sulphuric acid is shipped in drums of sheet iron of about 1600 pounds each; also in tank cars, similar to oil tank cars, of 24,000 to 50,000 pounds. The price of acid varies from \$1 to \$1.50 per 100 pounds at the chemical works. Chloride of lime is put up in sheet-iron drums of 500 pounds each, also in casks of about 1200 pounds. The present San Francisco quotation for it is \$2.50 per 100 pounds. Sulphide of iron can be purchased in casks of about 700 pounds at a cost of \$5 per 100 pounds, or can be made on the ground from crude sulphur and wrought iron. Sulphur can be purchased in casks of 300 pounds at a cost of \$2.50 per 100 pounds.

The process can be used to treat: All classes and values of siliceous oxidized gold ores; concentrates from the concentration of tailings of free-milling gold ores; telluride gold ores; iron and arsenical pyrites, zinciferous and antimonial ores carrying gold; ores that will not concentrate effectively and do not carry over 3% copper or 5% lead, and are not excessively high in alkaline minerals; siliceous tailings carrying a valuable quantity of gold. The process saves gold values only. Silver can be saved when this process is used by an auxiliary method.

EXPENSE OF RUNNING A PLANT OF 75 TONS DAILY CAPACITY.—CUSTOM MILL.

Where Used.	LABOR.		Shift Hours.
	No. Men.	Occupation.	
Mill at large.....	1	Superintendent	12
	1	Assayer.	12
	1	Assayer's helper.	12
	1	Bookkeeper.	12
	1	Night foreman.	12
	1	Machinist.	12
	1	Carpenter.	12
	1	Roustabouts.	12
	1	Night watchman.	12
Crushing and sampling.....	2	Camen.	12
	1	Crusher man.	0
	1	Sampler.	12
Fine crushing.....	2	Toll men.	12
	2	Oilers.	12
Engine and boiler.....	2	Firemen and engineers.	12
Roasting department.....	2	Firemen.	12
	2	Feeding and cooling and delivering ore to chlorination department.	12
Chlorination department.....	2	Headmen on barrels.	12
	2	Helpers on barrels.	12
	1	Precipitator.	12
	FUEL.		
		Coal or Wood.	
For power.....	3 to 5 tons.	6 cords.	
For roasting.....	8 to 9 tons.	9 to 10 cords.	

The amount of fuel required for roasting varies with the character of the ore and the roasting apparatus installed.

CHEMICALS.		Lbs. per ton.
For chlorination.....	Chloride of lime.....	10 to 12
	Sulphuric acid.....	15 to 25
	Iron sulphide.....	1
For precipitation.....	Sulphur.....	14
	Sulphuric acid.....	2½

* Men marked thus are not required when the mill is treating the ore of one mine.

Miscellaneous supplies, including assay materials, fluxes, filter press cloths, lubricating oils, incandescent lamps, etc., can all be covered with a charge of 15 cents per ton. Renewals and repairs will cost, depending on the location of the plant, from 15 to 30 cents per ton. The amount of water required can be safely estimated at 500 gallons per ton—for steam power and chlorination. This can be reduced if settling tanks are added, and water used over again.

Hydraulic Licenses.

Some time ago the California Debris Commission issued a notice stating that all licenses then in existence granting the privilege to mine by the hydraulic method would be canceled, and that it would be necessary for new licenses to be issued by September 1, 1902. This because it was desirable to have all permits issued in accordance with a new form adopted by the commission. Heretofore these licenses have been typewritten. The new licenses, which are lithographed, read as follows:

Revocable License, No. _____.

By virtue of authority conveyed by Act of Congress, approved March 1, 1893, the California Debris Commission hereby issues a license to _____ to mine by the hydraulic process in the _____ mine, near _____, California.

The operations of this mine are to be conducted in accordance with the instructions that may from time to time be given by the California Debris Commission.

* Minister of Mines Report.

What Constitutes a Mine.*

In the broadest sense a mine may be said to consist of a body of ore sufficiently large and rich to pay the original purchase price; all of the costs of mining, reduction, plant and transportation, together with a large percentage of interest on the investment. In determining, therefore, what constitutes a mine, it is necessary to consider each item of possible expense chargeable against the property, all physical and geological conditions, and such ore bodies as are developed, together with their bearing upon possible future ore bodies. Location of the property is likewise important. In this connection one must consider the availability of water, fuel and timber; the accessibility of the property, both for the purpose of shipping supplies to the mine and of marketing the ore or bullion. Dumping ground, mill and possibly even smelter sites have to be considered.

For the actual measurement and sampling of the mine there must be development work, and, when sampled, it is necessary to determine the actual value of the ore as it would be mined; what values can be saved and by what method the greatest percentage of profit will accrue to the operator.

The geological and physical problems in connection with the determination of a mine deal perhaps more with the future of the mine than with the actual cash value of the mine. In this connection one must consider not only the enclosing rocks, their persistence, definition and influence upon the mineralization, but must take into consideration the fissure, and, if present, the fault systems, because in the majority of deposits the ore occurs in fissures and faults, as we say, in "fissure veins." Fissures and faults are additionally important, because in many cases, as, for example, contact and impregnation deposits, the continuity of the ore body must be determined. If faulted by intersecting fissures, this must be known and the consequence determined. It is a fact ore bodies are more often irregular in dip, strike and form than otherwise, the valuable portion of the ore being controlled by some physical fact, such as the intersection of fissures with certain strata, or igneous rocks, or with each other. In a known mining district it is always possible by careful observation of these facts to calculate the position of valuable bodies of ore. In the district of Rico, Colo., there are many vertical veins which intersect a great bedding plane or fault of disturbance, approximately parallel to the strike and dip of the strata. The mining in that district has demonstrated the occurrence of large bodies of rich ore at this point of intersection. So regular are these strata, the veins, and this fault in strike and dip, that within reasonable distance one can calculate the position of the ore body and some value for it without development. This, however, can not be as great as the actual worth, because that previous to sampling and measurement the exact value can not be determined. In a very much simpler form the same condition of affairs, as far as value of property is concerned, exists in Butte. I would say that the great bulk of business which leads to the development of mines is done through lease and bond, the lease being for the purpose of opening and testing the property to see if it is worth the price which the bond calls for. The life of the bond is usually not less than one year.

The character of the ore above and below water is an important factor, because in most cases an entirely different method of treatment is necessary for the two ores. Above water level frequently we have high-grade ores that can be quickly and cheaply reduced by a simple mill upon the ground, whereas below water level the mill process may be involved and expensive or it may even be necessary to smelt the ores. These are important items in the cost of production because of the additional plant required and the uncertain factor of cost of reduction. Finally, from the geological standpoint it is necessary to consider whether the ores, even though sulphide, are primary or secondary. As many of my auditors know, if perchance they have followed or read the geology of Butte, as exemplified by Emmons, Wood, Van Hise and others, that in many cases there is a zone in the vein wherein are deposited below water level very rich bodies of ore which under normal conditions might be reasonably supposed to be permanent. Experience and depth have taught us that though the ores are still profitable, even in the face of constantly increasing mining cost, due to the greater depth from which the ore is mined, they are not by any means the bonanzas they were.

Butte is not the only mining district to suffer in this respect, many of our precious metal mines and sulphide copper deposits having more or less striking examples of this phenomenon—a zone of oxidation, a zone of sulphide enrichment and a zone of permanent values.

We have been dealing with the future of mines perhaps too extensively, but let us consider upon what basis a mine should be bought and paid for. Recalling the definition given in the beginning of the paper,

"A mine must contain ore bodies sufficiently large and rich to repay all charges against them, including capital invested and a large percentage of interest," would naturally lead to the question of how to determine these facts. It is manifest that the gross values are to be determined only by actual measurements of the ores blocked out, and the determination of the values by careful and conscientious sampling, with sufficient precautions are checks to assure the engineer that his results are absolute.

As the ore bodies, like other bodies, have three dimensions, they can only be blocked out by actual development. These ore bodies must be cut and drifted upon at sufficient intervals to determine the length, size and form of the valuable shoots. It is rare that development is so complete that all the ore bodies can be treated with equal weight. It is, therefore, customary to divide one's estimates into three classes:

1. Ore technically in sight.
2. Ore reasonably in sight.
3. Ore that under the conditions existing should be expected with further development.

This done, it is but a step to a calculation of the gross value of the ore bodies.

The next step must necessarily be the determination of the methods of mining and treatment of the ores for all time and of whatever grade and kind. The low-grade and the high-grade ores, the oxidized and the base ores, and to calculate the cost of converting them into cash.

The following is a reasonably complete summary of the charges which must be borne by a property before it can be considered a "mine:"

1. Cost of mining, labor and supplies.
2. Cost of development, labor and supplies.
3. Cost of reduction, teaming (tramping), milling, freight, smelting, losses in milling and smelting, commissions.
4. Cost of equipment of the mine.
5. Cost of equipment of the mill.
6. Cost of equipment of the smelter (if advisable to build).
7. Cost of the mine.
8. Cost of possible litigation.
9. Cost of management.
10. The amount of interest on the money advanced for purchase and equipment at nominal rates; and, finally,
11. A large percentage of profit.

These costs are distinctly chargeable to the mine and must not exceed the gross value of the ore as calculated above.

This does not constitute the entire field that has to be examined. We in Butte have been compelled to look to our titles and our rights under these titles. We must determine, after being satisfied that we have a legal title to our property, what is the extent of our rights in our own ground and outside of it. If we have extralateral rights and if there is a possible conflict of title to the very ore bodies in question through ore bodies coming from other than the ground in question. While there are few camps that have been so busily engaged in litigation as has Butte, there is no district where such matters can be safely overlooked. Even Butte existed nearly thirty years without litigation.

These are the principal points, broadly generalized, that must be considered in the determination of the question of what constitutes a mine. I do not wish to leave the subject, however, here, lest I should give my hearers the impression that only under such conditions can money be properly invested in mining properties. While I adhere to the above principles, I wish to state that they refer to cash purchases, as one would buy a horse or a house. It is something material. Opportunities for investments of such description are not abundant. Indeed, if this were the only method of mining investment the industry would be greatly crippled, for the discoverer would have to do all the development work, block out all the ore himself, and were he financially able to undertake such a task he would not be climbing mountains, living in the woods on bacon, canned cow and, as Eugene Field says, "other native fruits and things that grow out West in cans."

The property is only a prospect. It is leased and bonded for a period of time—usually one year. The lessee explores the ground with shafts, tunnels, drifts and crosscuts; and if satisfied in the course of time that he has his money's worth, he buys the mine under the terms of the bond. The smaller investment necessary for the exploration, and the smaller consideration usually demanded as the final price for the property, make this method attractive to many. But, unfortunately, only a very small percentage of prospects turn out to be mines at any price, so that this form of investment is purely speculative, and being speculative, has become a greatly abused field. It is the field of the middleman, who, with an insignificant investment, can organize a mining company, and through glowing accounts of possibilities and certainties interest many to invest money. I do not say this with any intention to be harsh, but as the property is not developed it must of necessity be a speculative venture to advance funds for the operations, and only those properties should be considered which are thoroughly described and favorably reported upon by competent, reliable persons.

May Lundy Gold Mine.

Written for the MINING AND SCIENTIFIC PRESS by H. W. TURNER.

The May Lundy mine is perhaps the most picturesque located of any in the State of California. It lies in Mono county, on the east slope of a high ridge of the Sierra Nevada, surrounded on all sides by grand mountain scenery. Within a radius of a few miles are the following peaks: Mt. Dana, altitude 13,050 feet; Mt. Conness, altitude 12,556 feet; Mt. Warren, altitude 12,337 feet; and Dunderberg peak, one of the dominant points of the rugged group north of Mill Creek canyon. The canyons vie in depth with the mountains in height, notably Mill Creek and Lee Vining Creek canyons, while not far east lies the dead sea known as Mono lake. At the base of the ridge, known as the Tioga crest, on which the mines are located lies a beautiful alpine lake of fresh water. At the outlet of this lake is the quartz mill, which obtains its water supply from the lake, the height of the lake having been increased by building a dam across the outlet. On the side of the escarpment, about 1200 feet above the lake, are situated the miner's boarding house and bunk house, as well as the blacksmith shop, etc. The ore at the present time is brought down from the tunnels to the mill on a cable in iron buckets. The property of the company comprises several veins, all of them situated in the same high spur. This spur (the Tioga crest) is composed on the west side of the slates of the Tioga formation and on the east side of a quartz-diorite or



May Lundy Mill, Mono County, Cal.

granodiorite. The plane of the contact of these two rock masses dips to the west at a high angle, and along this contact there is a vein known as the contact vein.

The veins now being worked, however, lie in the quartz diorite or granodiorite, dipping to the west. Three of these are known as the Jackson vein, West vein and East vein. They are from 30 to 100 feet apart. An examination of these veins in the tunnels and other workings shows them to be mineralized dikes of an aplite granite. The quartz veins proper occupy, at all points noted, the middle of these dikes, and often include chunks of apite which are impregnated with sulphides and form ore. All of the quartz of these veins is said to be of high grade and is milled. The dip of the veins varies, that of the East vein at two points being from 50° to 55° to the west. In the mines there are greenstone dikes which, according to Mr. Pierce, superintendent Crystal Lake G. M. Co., cut the veins and are therefore later than the apite dikes. Whether they are later than the quartz impregnating the dikes was not determined. These apite dikes are intruded along a joint system, the planes of which dip southwest at angles from 20° to 50° or more. Faults have frequently displaced the veins with a throw of from 10 to 30 feet, and the dark greenstone dikes are usually intruded along these faults. So far as known, this mine is the only one in the Sierras of any importance in which the veins are uniformly associated with apite dikes.

At the level of the mill a new tunnel has been run in to tap the veins at that level, and to furnish a cheap method of extracting the ore and transporting it to the mill. Mr. Pierce gives the total production of the property up to 1900 as \$180,000. The values are almost entirely in gold. An electric plant has been installed, and the lower tunnel is being run by machine drills with electric power, which is also used in operating the mill. Below the mill is a cyanide plant to handle the tailings.

All of the apite-dike rocks of the Crystal Lake

*A paper by GEO. W. TOWER, read at the Butte, Montana, session of the Mining Congress, Sept. 3, 1902.

mine veins are altered. The ore is more or less oxidized, even in the lowest workings 900 feet from the croppings. This may be due to the percolation of surface waters along the veins. The level of ground water is below the bottom of the present workings, this being due to the thorough jointing of the granodiorite and the steepness of the slope of the spur in which the mines lie. The concentrates are said to contain 6% of arsenic.

Forming a part of the north end of the Tioga crest is a dark porphyry, possibly the same rock as the greenstone which occurs as dikes in the mine.

Hoisting Engine at Oliver Iron Co.'s Mine, Ely, Minn.

The accompanying illustration represents the new double-drum Corliss hoisting engine, built by the Sullivan Machinery Co. of Chicago, Ill., now being installed at the Savoy-Sibley shaft of the Oliver Iron

with spiral grooves for 1½-inch rope. The gross load which each drum is capable of lifting is 29,000 pounds; seven tons of ore will be raised at each trip. Each drum is provided with two heavy band or strap brakes, which operate simultaneously. The powerful band friction clutches are located at the centers of the drums. The drum shafts are 36 feet long, 14 inches in diameter, supported by three bearings. There are two auxiliary rope reels, located inside each main drum, for taking up the slack of the hoisting ropes.

The engines are of the Corliss pattern, 28x60 girder frame, steam-jacketed throughout; when operating condensing the boiler pressure is 125 pounds; this is, however, increased to 150 pounds in case of accident to the condensing apparatus. The maximum hoisting speed is 2000 feet per minute, controlled by a quick-acting governor in connection with the Corliss valve gear. The engine reverse gear is of the steam-actuated spiral type. The brakes and clutches are

sure valve, which will automatically substitute air for steam or steam for air, in the case of failure of either operating medium. The machine has all modern safety appliances. These include positively actuated stops to prevent overwinding, dial indicators to show the position of the cages in the shafts, and automatically operated throttle valves for shutting off steam near the end of the hoist. There is also a small auxiliary throttle valve for controlling the engines after the main throttle has been automatically closed. This is operated by a step on the engineer's platform. Each Corliss cylinder is provided with two by-pass valves for connecting the two sides of the pistons when lowering. The engineer's platform is raised above the floor, and all hand levers and safety appliances are within easy reach of the operator.

A hoist of similar style, with but one 12x8½-foot drum, is operating on the Pioneer A shaft near by. The Sullivan Machinery Co. also manufacture flat rope reel hoists, conical drum hoists and winding engines and haulage plants for all classes of work. A letter to the company at 135 Adams St., Chicago, Ill., 71 Broadway, New York, or 431 Seventeenth St., Denver, Colo., will bring special catalogues and complete information.

Con. Mercur G. M. Co., Mercur, Utah.



JOHN DERN.

John Dern, president Consolidated Mercur G. M. Co., Mercur, Utah, makes annual report for the fiscal year ending June 30, 1902, showing gross value of gold produced: Golden Gate mill, \$1,359,844.10; Manning mill, \$97,220.37; total, \$1,457,064.47.

The average assay value of all the ore mined and milled during the year was \$5.72. The tailings averaged \$1.19.

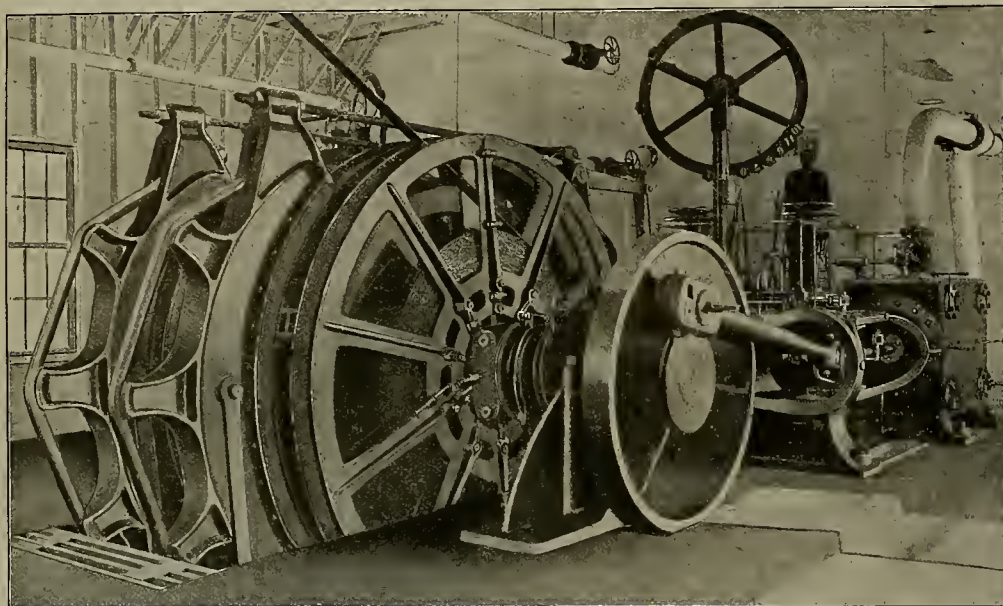
The mining costs were \$1.41 and the milling costs \$2.09 per ton, a total of \$3.50 per ton.

The expenses have lately been considerably reduced. During the last three months of the year covered by the foregoing figures the mining costs averaged \$1.32 and the milling costs \$1.70, or a total of \$3.02 per ton.

The dividends paid during the year amounted to \$465,000.

Prior to the period covered by this report the company paid \$235,000 in dividends. The total dividend disbursements of the Consolidated Mercur G. M. Co. to June 30, 1902, were \$700,000.

During the year the old Mercur G. M. & M. Co. paid its final dividend—\$9500—bringing that com-



Double Drum Corliss Hoisting Engine.

M. Co.'s mines, near Ely, Minn., occupying a floor space of 42x32 feet, of powerful and heavy design, complete in every detail; total weight, 176 tons. The hoist is of the double-drum, direct-acting type, the drum being loose on the engine shaft and driven with band and friction clutches. Two hoisting shafts are operated by the hoist, each drum hoisting in balance from the two compartments of one shaft. The drums are 10 feet in diameter; 9-foot winding faces provided

also operated by steam, and the brake engines, clutch engines and reverse engine are provided with oil-cataract cylinders to prevent sudden or jerky movements of the various parts.

In addition to the main steam brakes above mentioned there are two sets of auxiliary brakes, one set being operated by compressed air and the other by a hand wheel on the engineer's platform. A special feature of the brake gear is the automatic pres-

COMPRESSED AIR TRANSMISSION

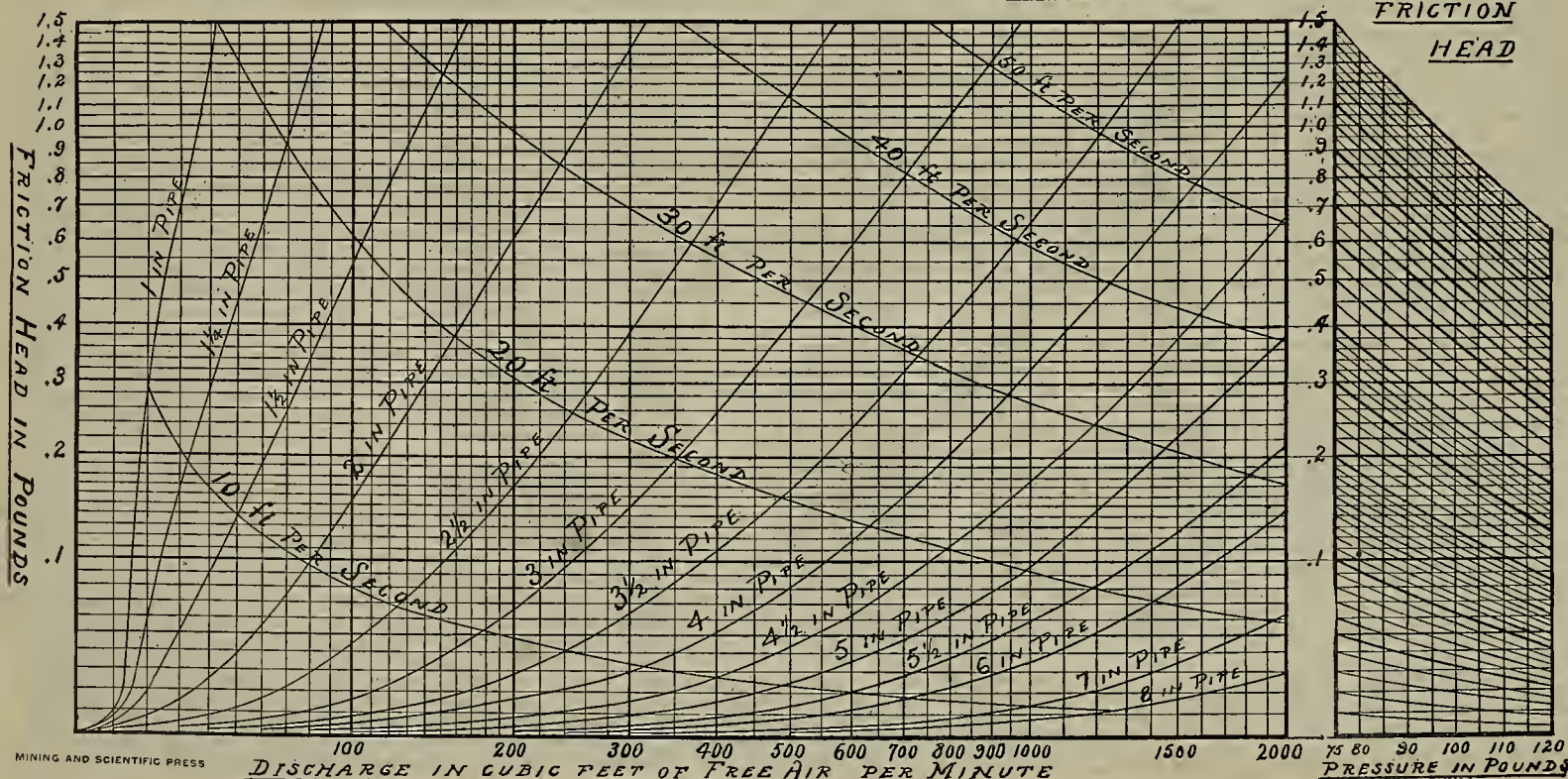
ADDITIONAL PRESSURE REQUIRED TO GIVE A

TERMINAL PRESSURE OF 75 lbs GAUGE, THROUGH 100 FT OF PIPE.

D.E. BIGELOW,

COMPARATIVE

FRICTION HEAD



pany's total up to \$1,490,500. DeLamar's Mercur M. Co. paid \$689,312.99 up to the time of the consolidation. Accordingly, the grand total of dividends paid by the properties embraced in the Consolidated Mercur G. M. Co. to June 30, 1902, is \$2,880,312.99.

The Manning mill was operated on old Mercur tailings, with some interruptions, during eleven months of the year. The extraction averaged 93.5 cents per ton and the expenses 59.4 cents per ton.

The most important improvement of the year was the extension of the Electric tunnel to the Lulu workings. Connection was made June 9, 1902, up to which time the tunnel was extended 1260 feet, making its total length 1660 feet. This tunnel affords a convenient and economical outlet for all ores in the Lulu and adjacent workings, and by means of a system of raises the ores from all portions of the Mercur mine can be cheaply handled through this avenue. The Electric tunnel runs under the reserves in the Lulu ore bodies and is connected with the workings above by a series of chutes. As the ore is broken it is dumped into the chutes, whence it is loaded directly into cars and conveyed to the shaft by electric locomotives. Where the ore was formerly handled three times it is now handled but once. The tunnel is large and straight, with long side switches—in fact, almost a double track the entire distance—is lighted by electricity, and well ventilated by raises and other connections to the surface. The trains run directly to and under the chutes. The road is equipped with two 10 H. P. electric locomotives, capable of hauling twenty tons per train, at a speed of 6 miles per hour, and eighty-seven cars of the capacity of one and one-quarter tons each.

The company has also driven a new tunnel, 335 feet long, to take the place of the old Saw Mill tunnel, which had been undermined, causing it to settle and close. This tunnel connects with the main shaft and affords ingress to and egress from the Golden Gate mine.

In the Golden Gate mine there are still large bodies of high-grade base ore, which are being drawn upon steadily for the regular proportion of the tonnage. In addition to the low-grade oxidized ore, there also remains blocked out a great amount of high grade oxidized ore, which is directly under a good grade of base ore. The latter must naturally be mined first.

Of the entire tonnage going through the mill, two-thirds is coming from the Mercur and one-third from the Golden Gate mine. On account of the past year's developments the Mercur mine has a large excess over the Golden Gate in ore reserves. The Mercur reserves are largely oxidized. Those in the Golden Gate are mostly base, where they are available. The base ore from the Mercur is more easily roasted than that from the Golden Gate, for, although they are mined from the same strata, there is a material difference in their general make-up and treatment. In the Golden Gate mine the base ores carry more sulphide of iron and arsenic than in the Mercur, and when the proportion of ores treated is right much better results are achieved. Accordingly, the Mercur mine furnishes most of the oxidized ore and part of the base.

The tonnage put through the mill has increased about 30% during the past four months. It was necessary to overhaul every piece of machinery in the mill in order to maintain a steady and high tonnage. They put in a complete set of roll shells and shafts and in many parts of the mill have put in new line and countershafts.

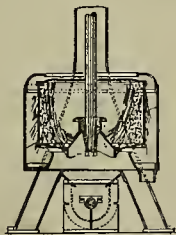
A simple mechanical change in the mill has proven economical. Up to last March there had been two driers used for calcining oxidized ore, or roasting base. These were expensive to operate and the results were not satisfactory. Since that time they have been stopped, and by means of an expenditure not to exceed \$50 the oxidized ore has been treated as well as when calcined with the driers, and the tonnage not reduced.

Mining and Metallurgical Patents.

Patents Issued September 9, 1902.

Specially Reported and Illustrated for the MINING AND SCIENTIFIC PRESS.

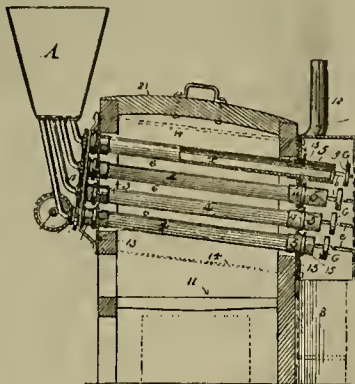
TREATMENT OF ORE SLIMES.—No. 708,504; H. L. Sulman and H. F. K. Picard, London, England.



Process of treating ore slimes which consists in separating by means of centrifugal machine ore slimes from residual water with which they are mixed by adding a little lime to charge, removing bulk of water, thereby introducing into machine an amount of leach-

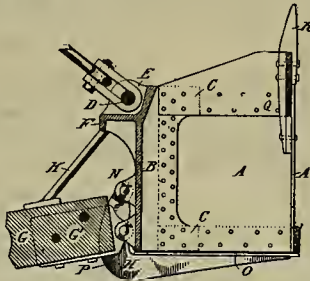
ing solution of volume equal to that of remaining quantity of adhering moisture introduced into slimes by centrifugal action, replacing moisture by added leaching solution.

APPARATUS FOR SEPARATING METALS FROM THEIR ORES.—No. 708,567; W. A. R. Loose, Provo, Utah.



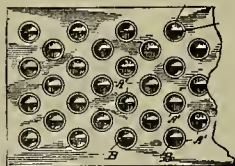
Apparatus for separating metals from their ores, combination with muffles, of inclosure or housing for discharge ends of muffles, housing or inclosure being closed on all sides, except bottom, having openings containing transparent material, shield interposed between housing and discharge end of muffle, transparent portion in line with openings in housing.

DREDOER BUCKET.—No. 708,587; A. W. Robinson, Montreal, Canada.



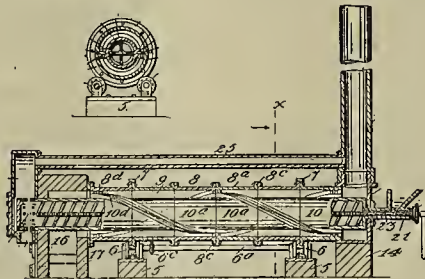
A bucket, back of which is composed of single continuous casting, having horizontal stiffening flange and projecting parts C, C, to which shell plate of bucket may be bolted, means whereby hoisting tackle may make direct attachment with casting and reinforcing band or plate at upper edge of mouth of bucket shell plate upon which teeth are supported.

TRAP FOR AMALGAM.—No. 708,599; G. R. Tuttle, Grass Valley, Cal.



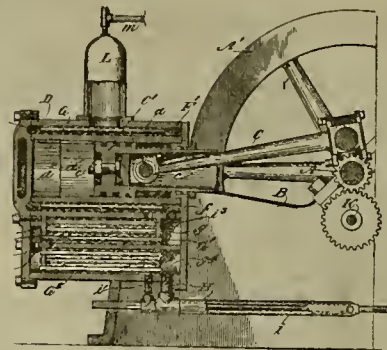
Amalgam trap comprising plate having recess therein, cell in recess comprising tubular body portion and partition therein adapted to be inserted into or withdrawn from either end of body portion and partition composed of dissimilar metals.

ORE ROASTING APPARATUS.—No. 708,615; A. M. Beam, Denver, Colo.



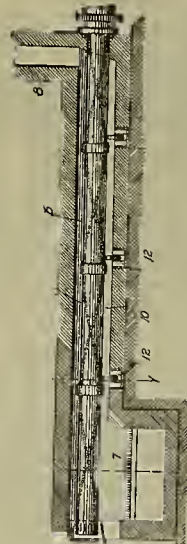
In ore roasting apparatus, combination with furnace and stack, of rotary shell, cylindrical conveyer passing through shell of such size as to leave concentric chamber between shell and conveyer, chamber being in communication with firebox of furnace at one extremity, and with stack at opposite extremity, parts so arranged that interior of conveyer has no communication with chamber, shell and conveyer being respectively provided with interior and exterior spirally arranged, longitudinally grooved ribs, and tongue connecting ribs whereby shell and conveyer are made to rotate together.

COMBINED GAS AND STEAM ENGINE.—No. 708,637; W. Heckert, Findlay, Ohio.



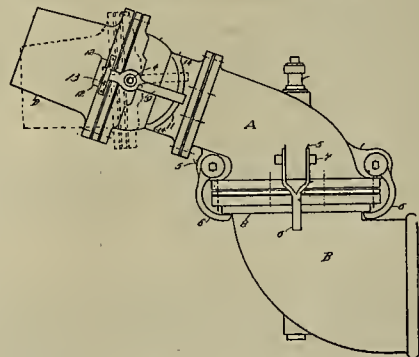
In combined gas and steam engine, cylinder having piston chamber, explosion chamber at one end, together with water space around cylinder and flues at each end separated from water space by suitable partitions or webs between inner and outer walls of cylinder; series of fire-flue tubes connecting flues through water space and subjacent water chamber with fire-flue tubes therein connecting flue at outlet from first-mentioned flues with similar flue at other end of water chamber; latter flue communicating with exhaust, to provide zigzag course for escape of residues of combustion, together with feed pipe for supplying water space through fire-flue tube containing water chamber and steam dome mounted on cylinder in communication with water space around same.

COMBINED ORE ROASTING FURNACE AND FUME SAVING APPARATUS.—No. 708,977; W. H. Motter, Denver, Colo.



Combination with combustion chamber, of rotary conveyer located therein, hollow feed screw connected with conveyer at one extremity, perforated pipe concentrically arranged in conveyer passing through feed screw, pipe connected to rotate with conveyer, stationary conduit connected with pipe, suction means connected with conduit for drawing off fumes rising from ore during roasting operation, liquid containing tank, conduit connected with suction means for forcing fumes into liquid of tank.

SAFETY ATTACHMENT FOR HYDRAULIC NOZZLES.—No. 708,693; P. Bouery, Weaverville, Cal.



Combination of two pipe sections, one of which is turnable in relation to the other, flanges on adjacent edges of sections, curved fingers detachably secured to one section adapted to engage flange on opposite section, nozzle and pivot connection by which it is secured to movable section, arms embracing and turnable about pivot connection, having one end fixed to one of pivoted parts, other end engaging segmental flanges on the other.

Mining Summary.

Specially compiled and reported for the
MINING AND SCIENTIFIC PRESS

ALASKA.

Heavy rains since August 1 flooded the Treadwell mines. Superintendent MacDonald ordered all men underground brought up and all work ceased except pumping out water. The water was 3 feet deep on the 220 level.

B. C. Goodman, Kougarak district, says: "On a gulch 7 miles from Windy creek, toward Dabl creek, a man named Dinsmore found the remains of a cedar boat, which, from marks upon it, seems to have been built in 1763. It was put together with wooden pegs. We arrived here on July 31 and proceeded to get to work. We put up our sluice boxes in a place where the pannings showed good prospects. We got as much as 20 cents to the pan, but after two days' sluicing when we cleaned up we only got \$5. Since then we have crossed the creek in several places, an herculean task, as the gulch is 600 feet wide from rim to rim, with water bothering us all the time. Finally we got back to the original place, when we ran into the paystreak. Pans pay from 2 cents to 10 cents. We stripped ground and set up our boxes and sluiced about two hours. When we stopped for the day, in examining the sluice boxes I picked up two nuggets, 20 cents and 40 cents, respectively."

Valdez reports the first flow of coal oil in Alaska struck at Cotell Sept. 7 at a depth of 200 feet. The gusher took everything away and rose 150 feet before being finally stopped. Ten wells have been located. Cotell is 30 miles south of Copper river. A body of coal was discovered near the same place recently.

ARIZONA.

COCHISE COUNTY.

J. G. Hearne of the Black Diamond M. Co., in the Dragoon mountains, Tombstone, says the company's new 200-ton smelter is completed. Reduction of ores will begin when the gravity tramway, 1½ mile long, to be used in transferring the ore, is finished.

Three miles from Bisbee lies the Lone Star group, owned by Pritchard, Evans, Callaghan, Brown and Ingram. The main shaft is that of the Gunsight mine. The shaft is 120 feet deep, with two side drifts, each about 40 feet in length, with an 18-inch vein of silver and copper ore, also carrying lead and gold.

The Copper Queen M. Co. are credited with contemplating the erection of a refinery at Douglas.

COCONINO COUNTY.

The Coconino Sun reports final payment of the purchase price, \$35,000, on the Last Chance mine, in the Grand canyon; owners were Cameron, Berry and Gale. The purchasers were the Canyon Copper Co., J. H. Page manager.

GILA COUNTY.

At Globe the Old Dominion Copper M. & S. Co.'s works are shut down; shortage of coke is the cause. Forty or fifty men will be retained at the mine.

MARICOPA COUNTY.

Seventeen miles from Wickenburg, J. H. Agaard, in the Castle Creek district, who located and partially developed the Fort Henry group of claims, has organized the Fort Henry M. & E. Co. The property is copper and gold. The development work is being done on two leads. One is an iron dike, the ore assaying \$7 gold and carrying copper; on the other lead is a 30-foot tunnel, with a pay streak of copper glance running from 40%.

The Black Rock Co. has twelve men on the Powell & Manchus group, 11 miles from Wickenburg. The mineralized zone is 800 feet in width. In the center is a pay streak 4 feet wide, averaging \$12 free-milling gold. Following this streak, a shaft has been sunk 200 feet and three shifts are running drifts each way, from one of which a crosscut has started. The ore being brought up from the 200-foot level shows the same values as that on the surface.

MOHAVE COUNTY.

The Miner reports the sale of the Leiland-Mitchell group of mines, near Boundary Cone, to Philadelphia and Salt Lake men for \$500,000. A railroad may be built from the Santa Fe, near Franconia, to the mines.

The opening of the ore bodies in the Dixie mines, west of St. George, Utah, causes Kingman to consider belief in a continuous belt, bearing copper ores, across the northern strip of Mohave county. The survey for the railroad from Congress Junction or Wickenburg down the Santa Maria and on to a connection with the Santa Fe at or near Franconia is to begin. The promoter of the enterprise

is F. M. Murphy. The building of this line would open up a rich section of Arizona and lessen the distance between California and central Arizona 200 miles.

J. Howell once had 400 men working on the Hackberry mine, near Hackberry, and will start the mine up again. This mine has a shaft following the incline vein to a depth of 600 feet. The mill on the ground will be overhauled and improved.

The P. & A. mill at Chloride has suspended operations because of lack of water. The Gold Road M. Co. employs fifty men; this number is being added to.

The Elkhart mine at Chloride will be opened several hundred feet below the present workings.

PINAL COUNTY.

F. J. Buck of the Copper Hill M. Co. will erect a leaching plant at the mines, in the Catalinas, near Oracle.

SANTA CRUZ COUNTY.

D. Rooney, manager Red Bird mines, near Nogales, says arrangements are completed by his company to develop the Red Bird mines on a large scale and a good many men will be put to work.

YAVAPAI COUNTY.

Fourteen miles from Prescott the Dunkirk M. Co. is developing a tunnel proposition, where by drifting along the vein something over 2000 feet, beginning at the southwest end of the Dunkirk, where a tunnel is now in 160 feet, a depth of 1000 feet will be gained. There is opened four ore shoots of an average width of from 1 to 3 feet, which show value of \$17 per ton. The company is building a wagon road from the Crown King stage road with a 12% grade down the canyon into Slate creek to their camp, which is at the southwest end of the Dunkirk.

CALIFORNIA.

ALPINE COUNTY.

At Loope a 20-stamp mill is building for the Curtz-Evans M. Co. The company has one 20-stamp mill running and the new mill will be ready to run Jan. 1. The company is working two mines—concentrating propositions, there being little free gold in the ore.

AMADOR COUNTY.

At the Bay State mine the 10-stamp mill is crushing ore from levels seven and eight.

BUTTE COUNTY.

Near Magalia the Nimshew dam and reservoir, now being constructed by the Bay Counties Power Co., will cover twenty-six acres. The dam will be 200 feet on base, 75 feet in height and 700 feet in length. In the base of the dam will be a 45-inch pipe to convey the water; just below the dam there will be a V in the pipe; the water will be conveyed in two 20-inch pipes down to Butte creek. On Butte creek the electric plant will be constructed; the water will have a fall of about 1000 feet. About fifty men are employed at the reservoir and about the same number on the pipe line and plant.

CALAVERAS COUNTY.

On the 21st and 22d inst. Angels will duly celebrate the advent of the Sierra Railway.

B. Thompson, manager project to bring the waters of the Stanislaus into Murphy and Angels, says the survey is completed. Next comes the work of constructing the ditch.

At West Point, in the mine operated by Groves & Lloyd, is a vein 3 to 4 feet, showing free gold.

At the Reliance mine a 5-tank cyanide plant is in.

The electrical machinery at the Bluejay mine, one of the properties of the Fanny Marie Co., is operating the Burleigh machine drills at the rate of 8 feet per day; about 750 feet more of the tunnel will have to be run, when the vein will be tapped at a depth of 900 feet.

At the Fanny Marie, at Glencoe, grading for the 10-stamp mill is finished; erection of the mill will soon begin.

HUMBOLDT COUNTY.

The Orleans Bar G. M. Co. has about mined out Graham's hill and is now shoveling in around the boxes, making a final clean-up. The company will then work some other part of its holdings there.

KERN COUNTY.

(Special Correspondence.)—W. W. Bradbury has a 13-inch ledge of good ore on the M. Free mine, after going through 50 feet of old works and one shot into virgin ground.

The Huiskamp M. Co. has temporarily shut down on account of breaking their machine drill. They expect to start work on the Comet again in a few days.

The Puritan M. Co. expect to start up the Mayflower soon.

Considerable new locations have been made in that vicinity lately.

Bakersfield, Sept. 17.

Though Kern county oil is low in price just now, seven companies operating in

the county paid \$10,000 in dividends in August. Since the first of the year nearly \$50,000 has been paid in dividends by oil companies in Kern county.

The 10-stamp mill and the concentrating plant of the Standard S. & R. Co., at Val Verde, were started up last Monday and are working most satisfactorily. The stamps weigh 900 pounds each.

D. C. Monroe is manager White Horse M. Co., Walker mining district, 8 miles east of Prescott. Superintendent Legge has a shaft down 250 feet on the Hammer mine, with 4 feet of sulphide ore in the bottom. It will be continued to the 500 level.

At Crowned King the Oro Belle mine is working two shifts in the tunnel and has its dam across the Humburg completed. The Lincoln is running its mill.

The Jerome News says that the Equator M. & S. Co. will erect a smelter on their property on Equator hill. The site is being surveyed.

At Lynx creek, Superintendent Berrie of the Hudson G. M. Co. has free-milling gold ore uncovered in shaft No. 2 of the Alice mine. The ore body is 5 feet thick; the ore runs \$20 per ton free gold.

At the Iron King, Superintendent Blanchard of the American M. Co. has shaft No. 1 down 116 feet, with a crosscut of 145 feet; shaft No. 2 is of an equal depth. A crosscut has been driven across the ore for 174 feet. A new hoist is being installed. A 20-stamp mill and rolls and a fifty-ton cyanide plant are projected.

The Consolidated Mines Co. at Randsburg are driving a crosscut tunnel through Rand hill to cut several ledges. They are in 185 feet.

In Radamacher the Wissahickon G. & C. Co. of Philadelphia has bought eighteen claims and will put men to work.

MADERA COUNTY.

A strike is reported in the Gambetta mine, Grub Gulch, the ore milling \$160 to the ton. The shaft has been sunk 800 feet. J. E. Porter is superintendent, J. Keith foreman.

NEVADA COUNTY.

The South Idaho mine is to be worked by the Idaho G. M. Co. Directors: J. E. Carter, J. H. Neff, J. Sonntag, C. E. Clinch, P. W. Mitchell, R. Noel, J. M. Thomas.

The Shady Creek mine has been bonded to C. Graham.

T. B. Gambel tells the Union that on the Yuba mine, 6 miles from Washington, the Yuba Con. M. Co., which owns seven claims on the Yuba river, will erect a 20-stamp mill on the property, and that he will employ forty men there.

The Osthuma G. M. Co. has been organized at Nevada City; J. T., D. E. and F. S. Morgan, W. F. Englebright, D. Richards.

The St. Gotthard M. Co. has opened the old Delhi ledge and is working on ore, under the direction of Superintendent Kartschke.

Odgers & Sons are pushing work on their property on Banner hill, and have a 20-foot ledge that assays \$10.50.

The Eddy M. Co. has incorporated, W. W. and L. R. Kirkham, E. A. Moore, E. J. Morgan, D. P. Waite, and will work the property on the hedrock near Nevada City.

Three machine drills are now in operation at the Murbie mine.

The Mohawk mine, near Graniteville, is working a 6 foot ledge.

At the Omaha mine sinking on the shaft will continue for a distance of probably 500 feet.

Near Grass Valley the Bullion Con. G. M. & M. Co. employs forty men. The Bullion three-compartment shaft is down 1150 feet.

SAN BERNARDINO COUNTY.

The Ludlow & Southern Railway runs from Ludlow south 7½ miles to the Bagdad M. & M. Co.'s mines, standard gauge, to haul ore to the Barstow mill.

SHASTA COUNTY.

The I. T. G. M. Co., 6 miles west of Delta, will put in a 4-inch gravity tramway 900 feet long.

The contest case of W. C. Bruson against the Ruby Hill C. M. & S. Co. has been postponed until December. The Ruby Hill Co. has filed an application for patent to the Monogram quartz mine, located in Section 16, Township 34 N., Range 3 W., and containing 160 acres. W. C. Bruson claimed 440 acres of Section 16 and filed a protest against the granting of the patent. He claims that he was at one time offered \$300,000 for the land, but refused.

The smelter for the Great Western G. Co., at Copley, will be shipped next week.

SIERRA COUNTY.

At the New Independence mine, Wolf Creek, W. Simmons, who has succeeded C. M. Root as superintendent, has sixteen men at work. By Oct. 1 the new mill will be finished; meantime the old 8-stamp mill

is used. The ledge is 7 feet wide and prospects well, showing free gold.

TRINITY COUNTY.

The Three Peaks mine, on Coffee creek, is sold to J. J. Chambers, representing the Great Western G. Co., for \$20,000. The Three Peaks is located near the Nash hydraulic mine and carries free-milling gold ore.

P. Joyce, former superintendent Center Star mine, Rossland, B. C., is interested in the Mason & Thayer group of ten claims, adjoining the property of the Jennie Lind & Maple Co. There are about 1000 feet of work on the property. The exploration is limited to two drifts, which have three ore shoots carrying ore which runs from \$15 a ton.

At the Three Peaks will be put up a 10-stamp mill for the Three Peaks G. M. Co., J. J. Chambers of Redding general manager.

TUOLUMNE COUNTY.

The new 10-stamp addition to the Republican mill is approaching completion. A run of 1000 tons of rock is being made at the Clio mill.

The Shawmut has hung up its stamps. The Mazzeppa, near Stent, is grading for a 20-stamp mill. The Nonpareil mine has been bonded to San Francisco men.

YUBA COUNTY.

The California Debris Commission wants proposals for building portions of barrier No. 1 in the Yuba river, 12 miles east of Marysville. Contract will be awarded Oct. 16 at noon. To ascertain nature of work and terms, address Lieut. R. P. Johnston, Flood Bldg., San Francisco.

COLORADO.

Denver papers say that A. P. Knight of New York city has been in that city for the past month endeavoring to effect a consolidation of all the big mines of the Cripple Creek district, the Colorado Springs and Cripple Creek district railway, the Colorado Midland, the Midland Terminal railway and the Portland mill. The United States Reduction & Refining Co. and the Telluride Reduction Co. had been considered in the deal, but the lines were subsequently drawn so as to exclude the two latter corporations. The plan is locally stated to comprise incorporation of a \$50,000,000 stock company, in which the half dozen leading mines of the Cripple Creek camp, the three railroads, and one, and possibly the three mills, would receive pro rated allotments in proportion to the cash value of their assets; little money to change hands, the only consideration being the actual amount of cash needed to effect the incorporation and pay any incidental expenses. At the consummation of the deal all stock in the new corporation to be pooled for one year, during which time the new management would take over the several and diversified properties, and readjust a plan of their handling, in order to bring their handling down to a more economic and profit-earning basis. Nearly all the concerns mentioned have been approached by Mr. Knight, by whom the scheme has been explained quite elaborately in private. The central idea of the merger is to carry out the trust theory in connection with Cripple Creek, but this will in all probability not succeed. There are obstacles in the path of such a scheme which, from what has been learned already, will render Mr. Knight's work futile. The New York promoter holds that the mines, railroads and mills have identical interests and should be run in the closest of connections. If the mines can be handled at low running expenses, they can produce more ore, earn more money, pay more dividends; the railroads, instead of charging exorbitant haulage rates, can work in conjunction with the shippers and deliver the ores to the mills, where treatment will be made at a nominal figure. As all the values come from the mines themselves (neither the railroad nor the mill being a producer of new wealth), it behooves the management to let the mines earn as much money as they can, since the profits will be divided up any way. The idea is to do away with duplicate and wasteful labor both in the mine, the railroads and at the mills. But the plan seems destined to defeat.

That the scheme has been talked of is indicated, however, by the fact that several of the mine owners and others admit they have been approached. J. T. Millikin, president of the Golden Cycle, said in this connection:

"Yes, I was approached about a month ago by a man who said he had come out from New York to effect, if possible, a consolidation of all the big mines of Cripple Creek with the railroads and mills handling Cripple Creek ores. I told him if he would take a balloon, go to heaven and consolidate the stars and come back, I would talk business with him."

Such was Mr. Millikin's laconic reply in discussing the deal.

A president of another large Cripple

Creek mining company said: "I do not think the scheme is in any way feasible. What is the use of our mining into a big stock company that may or may not pay dividends in the long run, when we know what we have and are getting our regular dividends right along."

A third president said: "I have been approached, but I want to tell you they can have my mine when they pay cash for it. I am not going into any great big stock deal, I tell you. I would rather manage my own property."

A representative of the United States Reduction & Refining Co. said they had never heard of the scheme until they saw mention of it in the Denver papers.

Representatives of the Short Line, the Midland and Midland Terminal, denied any knowledge of the deal, and stated that they had not even been approached.

BOULDER COUNTY.

The enterprise attracting the most attention at Eldora is the tunnel of the Revenue Development Co. on Bryan mountain. Starting at a point 75 feet above the channel of Middle Boulder creek it is designed to pierce the mountain for 6000 feet at an average depth of 900 feet.

The Gypsy Queen, Western Belle and Mother lode claims below Cleora, 5 miles east of Salda, have been sold to the Montezuma G. M. & M. Co.

Near Magnolia, the Corona G. M. Co. has bought the Black Cloud, St. Joe and fifteen other claims, comprising the Gold Hill group. The work has been placed in charge of J. P. Clark. Forty men are now employed on Black Cloud and St. Joe alone.

CHAFFEE COUNTY.

The Mascot M. & M. Co., composed of Illinois and Salda parties, has acquired the Mascot property, near Turret, and has let a contract for 1000 feet of work.

CLEAR CREEK COUNTY.

Near Georgetown, Superintendent Old has a three compartment shaft 285 feet from the Victoria tunnel to the C level to explore at greater depth the ore bodies of the Mendota vein.

Manager Branham of the Centennial mine has a 4½-foot breast of borinite ore assaying 20% copper, 860 in gold and \$15 silver.

The Atlantic mill, on Middle Clear creek, will be operated as a custom plant by F. Reed of Idaho Springs.

The Marshall-Russell and Royal companies on Miller mountain have crosscut 250 feet, cutting four lodes. The Royal tunnel, now in over 200 feet, has crossed several veins, one a 14-inch streak that carries free gold. Power for the drills employed in both bores is furnished by a large compressor.

Georgetown has notice from the smelting trust of an increase of \$3 per ton in smelting charges, or treatment, on all ores of a gross value of \$18 or under. The extra charge will have the effect of shutting off the sale of this kind of ore. However, very little ore of this grade is produced in these districts, the majority of the ores of this class being cobblings heretofore left on the dumps when the ore was assorted for shipment to samplers.

A mill run from the Haggart & Co. lease on the Altitude, or Colorado Central mine, 8½ tons, returned 48% lead and 737 ounces silver, or about \$370 per ton, the two wagon loads being worth over \$1600 each. There were 26½ tons of second-class ore, which ran 238 ounces silver, or about \$120 per ton. The entire shipment brought \$5886 net, after deducting freight and smelting charges. The lease is on the bottom level of the mine, 1000 feet deep under the surface, and is the production of the lease for one month, with five men stopping ore. The block of ground in this lease is 100 feet long and extends from the 1000 to the 850-foot levels. The ore shows gray copper, ruby silver and polybasite. The pay streak averages 3 feet wide.

The machinery for the Argentine tunnel of the Waldorf Co. is now in position.

Production is being made from the Santiago, recently bonded for \$175,000 to Denver men. Two drifts are being driven and two winzes sunk, with pay ore in sight in each.

Near Georgetown, the newly organized Elkins M. & M. Co., that owns the Terrible group, will develop. It is expected that 300 men will be actively engaged at the mine within a year. Mine and mill machinery, comprising a 14-drill air compressor, a 150 H. P. engine, the equipment for a large new mill, 5000 feet of water pipe, necessary water wheels, etc., will be put in. The mill will be erected at the tunnel entrance and the railroad will be related to the mine.

At Yankee, R. A. Hall talks of building a complete and independent railroad, owning its own rolling stock and appurtenances, to connect with the C. & S. either at Central City or Idaho Springs. The Fall River canyon would furnish a grade, and whether this movement is successful or not it is only a question of time

when a railroad will take this route to develop the Yankee Hill territory.

The Royal M. & T. Co., Miller mountain, near Empire station, in its tunnel has a \$15 vein for milling.

FREMONT COUNTY.

A 175-foot drift has been driven on the Era tunnel by the Montezuma G. M. Co. at Barnes City, west of Canyon City. A 45 foot crosscut is now being driven which has tapped a porphyry formation.

On the Empress of India lode assays give \$6 in gold, \$20 in silver and 10% copper, a total value of \$46.20. One hundred and forty men are employed on the property.

GILPIN COUNTY.

The Running Lode property, east of Black Hawk, in August produced 170 tons of concentrating ores, which went to the Newton mill at Idaho Springs. The production of smelting ores was 80 tons, which went to the local sampler and to the Denver smelters, averaging \$100 per ton. There are fifty men at work; T. Dunstone superintendent.

T. Tonge has been visiting Russell gulch and tells the Times that, while high-grade smelting ore is met with in paying quantities, the importance of the district rests, he thinks, mainly on the large bodies of medium and low-grade ore, and the tonnage output depends on the facility with which such medium and low-grade ore can be mined, handled and treated. The values in such ores cannot be satisfactorily saved by the stamp-amalgamation process in vogue in Gilpin county, but by concentration and the smelting of the concentrates it is thought that a saving of from 90% to 95% of the values can be effected. There is only one concentrating mill in Gilpin county, and that of only thirty tons daily capacity. There are a number of concentrating mills on South Clear creek, near Idaho Springs, running on "custom" ores, but no one of them is large enough to handle a big tonnage. In a comparatively direct line, the mills near Idaho Springs a distance of 5 miles from Russell gulch, can only be reached by crossing the intervening divide of over 9000 feet, and the wagon haul costs \$1.25 a ton. On the 6th inst. he saw a wagon load of ore leave one of the mines in Russell gulch for Idaho Springs, drawn by twelve powerful horses, that number being necessary to haul it to the head of Virginia canyon, from which point four of such horses are sufficient to take it down to the mills. The alternative of this route is to send the Russell gulch ore on the Gilpin County Tramway to Black Hawk, unload the same from the Tramway cars into the railroad cars and thence by the Colorado & Southern Railroad to Idaho Springs, a total distance of 17 miles, the total freight being \$130 per ton. The great need of Gilpin county in general, and of the Russell gulch district in particular, is the erection of a large concentrating mill, built and equipped on the most up-to-date principles and comprising the most modern improvements. The only available site for such a mill is on North Clear creek, higher up the stream than all the present stamp-amalgamation mills, and therefore having clear water. This site is convenient to the lower terminus of the Gilpin County Tramway, by means of which the ore could be collected from the shafts of the Russell gulch mines, conveyed down hill almost by gravity and dumped automatically from the ore cars into the bins at such concentration mill, at a cost not exceeding 40 cents per ton, as compared with the present rates of \$1.25 and \$1.30 between mine and mill. The company erecting and operating such a mill should also own large properties containing practically unlimited quantities of the right kind of ore for the supply of the mill, so as not to be dependent on "custom" ore. When opened up and operated in connection with such a mill, the Bimetallic and King Bee groups in Russell gulch could alone produce a minimum of at least 1000 tons of ore per day of the minimum average of say \$10 per ton, which could be mined and dumped into the cars of the Gilpin County Tramway at an average cost of not to exceed \$1 per ton, carried by the Tramway to and dumped into the ore bins at such mill at a cost of 40 cents per ton, reduced at such mill from four tons of crude ore into one ton of concentrates worth \$35, at a cost considerably less than \$1 per ton on the crude ore. Such concentrates would cost from \$1 to \$1.50 per ton (i. e., at the rate of 25 to 35 cents per ton on the original crude ore) to haul by railroad to the smelter, and \$3 per ton (i. e., at the rate of 65 cents per ton on the original crude ore) for smelting charge, leaving a minimum net margin of profit, after allowance for loss in concentration and other contingencies, of at least \$5 per ton of crude ore, which on the basis of a minimum of 1000 tons per day would mean a net margin of profit of at least \$5000 per day for the operation of the above-mentioned two

groups and the concentrating mill. On "custom" ore, of which there would be an ample supply available, the minimum charge could be \$1.25 per ton and the maximum charge \$1.50 per ton.

GUNNISON COUNTY.

Near Gunnison, the Colorado Mines Con. M. Co. has its mill on the Cachetopa creek completed. The Standard & Sterling tunnel is in 1000 feet.

Superintendent Welch of the California-Colorado S. M. & M. Co. says his company will build a large mill at the Ruby Chief mine in the Irwin district to handle the low-grade ores.

R. H. Terhune has completed a run on 1500 tons of ore at the Tomichi valley smelter at Cosden. The Southwestern smelter at Whitepine is to be remodeled by Manager Muther.

Gunnison reports the Augusta Metal M. Co.'s Pittsburg tunnel into Augustum mountain 1500 feet, the remaining 1100 feet to be completed next season. The property is daily producing from the upper workings, the Dark canyon tunnel, twenty-five tons of ore; packed by jacks to Anthracite, loaded on the trains to the Pueblo smelters. When the new tunnel is completed the packing of ore will cease, as a wagon road reaches it. The company anticipates a heavy output of ore on the completion of the tunnel, enough to furnish a mill with 100 tons daily, besides shipping 25 tons per day.

The Colorado M. Con. Co. will soon have its concentrating mill on the Cochetopa creek completed, treating the ores from the Sterling and Standard lodes daily; it has a capacity of fifty tons. The tunnel, which develops both properties, is now in 1000 feet, showing ore the entire distance. A shaft is to be sunk in the tunnel 500 feet from the breast. It goes down on 5 feet of ore.

LAKE COUNTY.

A company is developing the Arizona place on Empire hill, Leadville.

The Leadville News-Dispatch says the pumps at the Valentine mine began work in first-class condition. The pump in the shaft has been there over a year and a half and it was a question whether it would work or not when the steam was turned on. At the first effort, however, it began work faultlessly and is throwing sixty gallons of water per minute. The pumps on the Morocco and Bon Air mines are throwing large streams of water, and in a week the Morocco shaft will have been unwatered.

Manager Jones of the Cloud City Co. is making preparations to resume work by Oct. 1st. The California Gulch people are also considering the proposition of resuming work as soon as the Morocco and Bon Air shafts can be pumped out.

At Leadville, the new mill at the A. Y. & Minnie mine is running on low-grade mineral mined on their property. The A. M. W. mill is also operating on low-grade tonnage from that property.

The Yak tunnel is producing from 150 to 300 tons a day of all classes of ore and is being pushed ahead toward the Ihex ground.

LA PLATA COUNTY.

Durango reports a strike in the Porcupine 3500 feet west of the Neglected shaft, on the same vein. The ore is from 2 to 4 feet wide and is the same in its detail as the Neglected. The Porcupine has a tunnel 350 feet long, and the strike, by survey, has a depth of 1700 feet greater than the lower workings of the Neglected. The ore assays \$100 in gold.

MESA COUNTY.

J. V. Howard says that in ninety days two reverberatory furnaces will be in Grand Junction, and by January 1 two blast furnaces, with 200 tons a day capacity, will be treating ore.

OURAY COUNTY.

The Picket mine, 7 miles southeast of Ouray, Uncompahgre mining district, is sold to G. L. Bradley of New York for \$40,000. It is a smelting ore. Mr. Bradley is general manager Revenue Tunnel Mines Co.

PITKIN COUNTY.

At Aspen, the Mollie Gibson mine, once the greatest silver producer in Colorado, has closed down. The property is said to have passed into the control of a Cripple Creek banker.

ROUTT COUNTY.

Near Steamboat Springs the Verde M. & M. Co., 3 miles north of the Colorado line, is putting a plant of machinery on a promising copper-gold lead. The ore is high-grade copper, carrying some gold. E. Hinton is manager.—The North Fork M. Co. S. Edgar manager, is working two shifts on a contact vein 3½ feet in width of copper and gold ore. By sorting, the ore will stand the wagon haul to Laramie.—J. E. Love, resident manager Comstock M. & M. Co., North Fork of Snake River, has three veins which carry copper, lead and gold. One vein is 8 feet

wide. A crosscut tunnel 200 feet long has been run, and when run another 200 feet will cut the farthest vein at a depth of 300 feet.—The Wyoming C. & G. M. Co., C. R. Henderson manager, is placing machinery on the Scott claims.—The Primrose M. & D. Co. of Denver has a three years' lease on the Elkhorn mine, ½ mile south of the Wyoming-Colorado line.—The Three Forks M. & M. Co. has a silver and lead property 60 feet north of the Colorado line. They have 2½ feet of ore that averages \$40 per ton.

SAN JUAN COUNTY.

The Silverton Standard reports ten stamps arriving for the Silver Wing mill, near Eureka.—Gray copper and steel galena from the north drift of the Hercules, Prospect basin, Mammoth T. & M. Co.'s property, give returns of \$6 gold, 650 ounces silver and 30% lead.—B. Zan has a contract for 600 feet of tunnel for the Sioux M. Co. When this contract is completed, power drills will be placed by the company, which will continue the 1100-foot hole to the Toltec vein.

A test shipment of good grade ore has been sent to the Kendrick-Gelder Smelter from the Idaho, on Kendall mountain—the first ore sent from the Idaho in many years.

The New York-Brooklyn mine, near Chattanooga, has returns from a carload of ore which netted them about \$3100—an increase in the value of the ore of more than 100%, the previous shipments having netted about \$45 per ton.

The first carload of ore shipped from the upper workings of the King group of mines over the new tram has been sent to the smelter. The lower tunnel is progressing. On the King purchase this week another \$40,000 was paid on the purchase price by Mr. Kinney, the president of the Royal M. & I. Co., to Herr & Woods.

A 10-stamp mill at the Brooklyn mine, near Chattanooga, is to be in operation before the snow comes. The low-grade ore from the mine is being saved; the high grade is being shipped to the Durango smelter. The average production of this smelting ore is three cars per week; values run from two to three ounces gold.

SAN MIGUEL COUNTY.

A. B. Frenzel writes the Journal that he will soon be in Telluride. For a year he has been in Europe making experimental tests in his vanadium ores and promoting a company for development of the property, and has been successful. He has a group of vanadium territory 15 miles from Telluride.

SUMMIT COUNTY.

A. M. Gillaspay has molybdenum ore from Ten Mile district, near Robinson. Four claims are sold to Boston parties engaged in the iron and steel trade. Tests show the crude ore to contain from 10% to 40% molybdenum and some gold. It can be concentrated to produce 50% molybdenum.

TELLER COUNTY.

Cripple Creek says the grade of the ore in the Golden Cycle property is increasing in value. That is the biggest low-grade proposition in the district; the average value of the ore broken runs about \$18. The increase during the last month shows that the shipments are averaging \$20 to the ton. The increase of \$2 per ton amounts to \$7000 a month profit to the company, as they are shipping 3500 tons of ore each month.

Cripple Creek continues to discuss the water problem. It is now proposed to organize a pumping association to operate in the northern end of the camp, where the water course cut by the Standard tunnel some years ago was drained down to that level to drive a tunnel to connect with the 600-foot level of the El Paso, which is about 225 feet below the Standard tunnel, about 4200 feet long. While this work is in progress, a drive would be made to the north to cut the known water course. If water should come in too rapidly, it should be bulkheaded until connection can be made with the tunnel. When the water is drained down to the 600-foot level the El Paso shaft could be sunk deeper and another level extended over to the water course. It is figured that, as the lift would be short, a powerful pumping plant could handle it more economically than if it had to be raised to the surface. This tunnel would strike the Elton mine at 945 feet and the Mary McKinney, Anchoria-Leland and Gold King at considerably greater depth than they are now able to work without employing heavy pumps.

The Xerxes and Ernestine Cos. have a leasing plan that is in some ways new. They throw open their territory to leasers upon the following terms: First year, no royalties at all; second year, 15% royalty; third year, 20% royalty. The plan of leasing without royalty is favorably received, being an inducement to leasers on undeveloped property of prospect companies. If followed out, some of the local

concerns which own good patented territory will be able to have it developed. A second provision which might be made would be to grant any lessee opening ore an extension of six months or a year on his lease.

J. R. McKinnie has sold the controlling interest in the Squaw Mountain M. & M. Co. to H. L. Coe & Co. of Springfield, Mass.

The new \$75,000 equipment of the El Paso Con. G. M. Co. is in operation.

Good ore is coming from the south end of the Black Belles property.

The initial shipment from the recent strike in the Mary Cashen gives good returns.

Recent development at the Wild Horse property on Bull hill makes it among the greatest producers of high-grade mineral in Cripple Creek.

A small shipment of El Paso ore, 470 pounds, returned values at the rate of \$19,275 per ton. This mine produced 760 tons during July, the gross receipt for which was \$51,298.42.

H. H. Barbee has been appointed local business agent of the Princess Alice Con. G. M. Co.

The Stratton's Independence, Ltd., Co. may cease operations on the property and lease the entire territory.

A body of \$20 ore has been opened by a leasing company operating the Gladstone on Globe hill.

Development work at the Shurtleff No. 2 on Bull hill shows that the strike on that property is an important one.

The Practical Leasing Co., operating on the Trachyte, has opened another body of ore.

The Bedford G. M. Co. has begun work on the Ocean Wave claim of the Little Puck Co., Squaw mountain.

IDAHO.

BOISE COUNTY.

The World says that J. T. Grayson, who bought the gold mine, at Quartzburg, has bought the Iowa group of five claims east of the Gold Hill for \$60,000. He will begin work this fall on the Gold Hill. The water was pumped out of the mine last fall. The shaft is 400 feet deep. There is now 150 feet of water in the shaft.

The shaft on the Last Chance mine, at Quartzburg, is down 250 feet, 100 feet below the level of the creek. It is turning out good ore. Besides the free gold, the vein carries sulphurets which run \$60 a ton. The mine is owned by Beary, Clemens & Daly.

IDAHO COUNTY.

E. Luria, of Hamburg, Germany, who bought a half interest in the Baby Louise, at Hump, will put a 10-stamp mill and cyanide plant on the property.

R. M. Sherman, on Siegel creek, 6 miles east of Elk City, 50 miles from Silties and 20 miles northeast of Buffalo Hump, has thirty-five claims, for which much is claimed. One ledge is 14 feet wide and contains a streak of ore 6 inches in width, that widens to 2 feet at the 250-foot level. At this depth the ore values run \$100 to the ton, the remainder of the ledge ranging from \$14 to \$16 a ton.

The Hogan group of mines is owned by Hogan Bros. It lies 16 miles southwest of the Sherman group, 12 miles from Elk City. There are thirty claims in this group, and 160 acres of placer ground. A 20-stamp mill will be in operation next month, the first installment of 100 stamps to be put in.

At Buffalo Hump about thirty stamps are dropping on the Crackerjack and Big Buffalo, owned by C. Sweeney of Spokane, the Wise Boy and the Jumbo. This is a low-grade, free milling camp; all four of the mines are paying dividends and good properties are being developed.

At Dixie, Hogan Bros. of Butte have a porphyry dike property 300 feet wide. They are putting in a 20-stamp mill and if the ore runs even as low as \$3 to the ton it will be a dividend payer.

A fifty-ton cyaniding plant is being installed on the Lincoln group at Neal, owned by Hodson & Kennedy. The Checkmate is dropping ten stamps.

KOOTENAI COUNTY.

(Special Correspondence).—The Dandy mine at Rathdrum have a silver-lead proposition, carrying some gold. They are running a crosscut tunnel 250 feet. It is a concentrating ore.

Rathdrum, Sept. 11.

OWYHEE COUNTY.

Near Silver City, at War Eagle mountain, the Poorman mill has resumed. For years the mill has lain idle. The vein discovered 1100 feet beneath the surface, 400 feet beneath the deepest of the old workings, is the same vein from which so much good ore was taken in the early days. The starting of the mill is for a test run to determine how well the values can be saved with the present equipment. It is expected that changes will be made.

SHOSHONE COUNTY.

(Special Correspondence).—The Empire State-Idaho Development Co.'s Burke mines at Burke are operating the mine with day shift and the mill with night shift, but are not shipping any ore at present. In fact, but one or two mines in the district are shipping any ore. They are all awaiting the action of the American Smelting & Refining Co. If the smelter trust draws the lines much tighter it may mean the closing down of the mines here. Everything is unsettled.

The Hercules M. Co., Burke, are driving a new tunnel, which will be about 2500 feet in length when completed. They will install a compressor plant in the fall. They employ sixty men at present. The ore is galena. H. L. Day is manager.

The Anchor Con. mines at Burke are driving a tunnel on the lead and the indications are very good for some first-class ore. The tunnel is now about 1700 feet in length.

Burke, Sept. 10.

(Special Correspondence).—The Empire State-Idaho Development Co.'s mill at Kellogg has not been shipping any ore for some time. They now have several hundred tons of concentrates ready for shipment.

The Cœur d'Alene Development Co. at Silver King are operating their mill on ore from the Crown Point mine, but are unable to ship the concentrates until a settlement has been made with the smelter.

The Bunker Hill M. & C. Co. at Kellogg are shipping about 100 tons of concentrates per day to the smelters, the trust not being in a position to dictate to them how much they can ship and how much they will pay the mine for the product. The Bunker Hill Co. are now taking some ore out through the new tunnel, which is nearly completed and which will do away with the aerial tramway running from the mill over the city of Wardner. The tunnel is about 2 miles long. Ed. Kellogg, Sept. 13.

W. Powers of Mullan has a contract for 800 feet of tunnel work in the Reindeer mine, near there.

The decision of Warren Truitt, master in chancery for Judge Beatty on the accounting in the Hanley case, is to be filed with Judge Beatty soon. Kennedy Hanley has been awarded an eighth interest in the Skookum mine at Wardner, owned by the Empire State-Idaho M. Co. and he is suing for over \$300,000, which he claims as his share of the ore mined in the past. Suit was recently brought by C. Sweeney and the Chemung M. Co. to have Kennedy declared the holder in trust for the Chemung M. Co. of the eighth interest in the Skookum, which he purchased. W. B. Heyburn, representing Mr. Sweeney and the Chemung Co., has filed an application before Judge Mayhew to have a receiver appointed for any money which might be paid Hanley by the Empire State-Idaho Co. on account of his eighth interest. The receiver, it is urged, should disburse the money of the Chemung Co. Another development lately has been the application of Mr. Heyburn for the Empire State-Idaho, to amend his original answer, so as to set up the claim that the ledge involved in the Skookum case does not have its apex in the Skookum ground. The case has gone past the United States Court of Appeals to the Supreme Court of the United States.

Murray hears that the Simmons group has been bonded to J. K. Clark of Portland for \$150,000, a payment of 10% made.

The Stewart M. Co. has been organized to develop and sell the ores from the Senator Stewart mine at Kellogg; A. M. Strode of Mullan, A. Benicks of Wardner, W. N. Morphy, C. Kallem and N. W. Thornton of Wallace.

MICHIGAN.

HOUGHTON COUNTY.

At Houghton, an over-hoist in the Red Jacket shaft of the Calumet & Hecla shattered the cage, which fell back into the shaft. The rope parted and the entire 8000 feet went to the bottom. No one was injured and but little damage was done to the shaft. The friction was so great from the passing of the rope over the sheaves that they took fire.

MISSOURI.

JASPER COUNTY.

Joplin reports a record breaking week in tonnage of lead sold. At Aurora the assay basis was cut \$1.50 per ton to \$34.50, and there were no takers for the ore even at that reduction. In Joplin and Oronogo offerings were \$1 per ton less, while at Prosperity and Duenweg prices were practically unchanged. In several instances in Joplin, where one buyer made an offer of \$1 less, the seller secured the same price from another buyer by declining the cut. The assay basis for the bulk of the best ore is strong at \$35 for 60% zinc, while

other ore sold at \$34 and \$33, as it graded down in quality.

The steady high price for lead ore is causing some operators to turn their attention more to this product, the price continuing firm with active demand at \$49 per ton. During the corresponding week of last year the highest price paid was \$26.50 per ton, \$11.50 per ton less than the past week, and lead sold at \$46.50 per ton, \$2.50 less. The shipment was greater than the past week by 622,100 pounds of zinc, but less by 390,900 pounds of lead and \$46,880 in value. For the corresponding thirty-six weeks the shipment this year was less than last by 2,595,980 pounds of lead, but greater by 13,817,130 pounds of zinc, and in value \$1,126,755.

MONTANA.

DEER LODGE COUNTY.

Danielsville reports that the mines at that place will start next week, and that in a short time the mill now building will be ready to receive ore. Travel between Danielsville and Anaconda is large.

FERGUS COUNTY.

Lewiston reports placer gold discovered on Fish creek, a tributary of Little Bull river; 3 miles have been located during the past week. That gold exists in the beds of many of the rivers of southeast Kootenai in considerable quantities has been proved. The latest discovery in the district is that of Violet, Dore & Armstrong on Fish creek, 12 miles south of Fort Steele. Spokane men may put in a dredging plant and work the ground for a sixth interest.

At Kendall, J. R. Cook has bought a half interest in the Arizona and Stand Pat claims. R. Clark has bought the Mountain Rat, Elkhorn and Blacktail claims. The Elkhorn M. Co. will be organized.

MADISON COUNTY.

The Watseca mine at Rochester employs 114 men, the mill fifteen men. The Elgin mine is working a large force. E. W. Merritt expects to soon have men at work on the Longfellow mine.

The mill at the Montana mine at Sheridan was partially destroyed by fire last week.

MISSOULA COUNTY.

A. P. Johnston of Superior says that more claims have been located in that section and near Cedar creek this year than in any previous twelve months, and that development work is going on extensively.

PARK COUNTY.

Anthracite coal has been found in the Boulder mining district near the mining camp of Contact. The discovery was made by A. Cooper, a prospector, in a gulch near the Milwaukee & Standard M. Co.'s mines.

NEVADA.

ELKO COUNTY.

F. Smith, from Jasper, brought 150 bars of silver and lead, the product of a run of the new smelter installed by C. Spence. The smelter has closed down and the miners have been laid off. As soon as there is an increase in the water supply, operations will again begin.

EUREKA COUNTY.

Ore shipments by rail from Eureka district for the week ending Sept. 12 were as follows: Excelsior mine, 45,180 pounds; Eureka Con., 44,870. From Hamilton—Rosso-Homestake, 104,870.

HUMBOLDT COUNTY.

At Lovelock the Enterprise M. & O. Co., C. Floranden secretary, has incorporated and acquired two properties, one in Troy canyon, 5 miles south of American canyon, and the other in Fisher canyon, 2 miles farther. Each is a placer claim.

LINCOLN COUNTY.

The new 500-ton mill of the DeLamar Co. is about completed.

NYE COUNTY.

E. Lande, L. H. Jackson, F. and R. B. Bain, C. E. and E. W. Elliott and J. P. Allen are the directors of the North Tonopah M. Co., incorporated on the 16th inst.

The Gold Hill ledges parallel those of the Mizpah and the Valley View; the property joins the Valley View on the south. A part of it lies between the two claims of the Tonopah & Salt Lake Co. The main working shaft is down 200 feet. The property is owned by J. L. Butler, Brounger Bros., T. L. Oddie and J. W. McCulloch.

The Miner says samples of ore from the late strike at the 440 level of the Mizpah Extension shaft, on the east side of Mount Oddie, give values of \$9 per ton gold and two ounces silver.

The Gold Mountain M. Co. is incorporated at Tonopah. It owns eight claims discovered in Gold mountain by C. Runge and will run a tunnel that will cut the surface vein at a depth of 300 feet.

In Liberty camp, 25 miles northeast of Tonopah, ore is found at the deepest

workings—500 feet—that assays 200 ounces silver per ton. Twenty-five miners are employed. The company is contemplating reduction works.

The shaft of the Montana-Tonopah Co. is projected to go 1200 feet.

STONEY COUNTY.

The Con. Cal. & Virginia M. Co. has received \$2972.89 in gold coin as proceeds of the sale of four railroad carloads of ore to the Selby Smelting & Lead Co.

In the Gould & Curry mine, on the 425 level, the northwesterly drift from the main west drift is in 242 feet. The face is in porphyry and quartz, the latter assaying \$5 per ton.

In the Utah Con. mine the raise started in the north drift from surface tunnel No. 2 has been carried up 12 feet; total height, 12 feet. The top is in ore showing value by assay of \$4.75 per ton.

The water in the Chollar combination shaft on the Comstock stands 160 feet 2 inches below the measuring point in that shaft, having fallen 3 inches during the week. This is the lowest the water has been since pumping under the present system began at the C. & C. shaft. At the latter shaft hydraulic elevator No. 1 has been in steady operation for some time past, except when stoppages were made to save pressure water, and the mine water is easily held at a short distance below the 2150 level station.

In the Justice mine, during the past week, in the north drift from the top of the upraise above the 370 level, they have been cutting out for square sets and have saved 16 tons and 180 pounds of ore, averaging \$14.29 per ton by car sample assay. In the north drift, 100 feet below the 600 level, they have started an upraise at a point 60 feet in from the winze and have advanced the same 10 feet. From this upraise they have saved 5 tons and 830 pounds of ore, averaging by car sample assay \$32.91 per ton.

In the Mexican mine the west drift on the 1600 level is out 88 feet. The face is in porphyry, with stringers of quartz and seams of clay.

On the 1600 level of the Union shaft the joint Union Con. and the Sierra Nevada crosscut started at a point in the main west drift 765 feet from the main station is in 360 feet. The face is in clay and soft porphyry. The south drift from the main west drift on this level is in 581 feet south of the north line of the Union Con. mine, with soft porphyry and clay in the face.

Drill hole No. 2 on the Brunswick lode is down 706 feet, with the bottom in quartz and porphyry.

The official letter from the Savage mine says: 425-foot level from the Gould & Curry tunnel—the north drift on the fifth floor of the upraise above the north drift from No. 2 east crosscut has been driven 18 feet during the past week through porphyry and low-grade quartz. The face is now in quartz assaying from \$5 to \$15 per ton.

WHITE PINE COUNTY.

L. P. McCreary has a bond on ten mining claims on the east side of White Pine mountain, agreeing to pay \$5000 for the same before August 19, 1907.

NEW MEXICO.

GRANT COUNTY.

Lordsburg reports the sale of the Comanche group of mines in the Burro mountains to J. S. Curry of Ironwood, Mich., C. J. Laughren, Escanaba, Mich., T. J. Atkinson, Charles Humphrey, Ironwood, for \$105,000. A leaching plant of 200 tons capacity is to be erected on the property. Lordsburg says a smelter of 200 tons capacity to treat the copper ore will be built at Lordsburg and a railroad is to be built to a connection with the Southern Pacific or the El Paso & Southwestern.

The copper ore of the Michigan-New Mexican Copper Co., Virginia district, near Lordsburg, assays \$12 gold, \$3 silver and 8% copper. The company is building a 30-ton concentrator, to be in operation December 1.

Shipments of lead and iron ore from the Granite mine at Stein's Pass have been temporarily prevented by recent rains.

S. W. Winn, manager Mineral M. Co., is determining upon methods of working the company's properties, Stein's Pass district.

J. B. Dibble of the Lena M. & C. Co., Lordsburg, will have the Miser's Chest unwatered.

TAOS COUNTY.

W. Fraser, superintendent Fraser Mountain C. Co. at Twining, is daily producing three tons concentrates, which will be matted when the smelter is order. The product will be matted on the Atlantic coast. The smelter has a daily capacity of 126 tons. About seventy men are employed in the mines and fifty men with teams are burning and hauling charcoal and coke.

OREGON.

BAKER COUNTY.

Sumpter reports that C. C. Pratt of Portland has in operation on Powder river, near Wind creek, a gold-saving plant that is designed to eliminate the cost of handling ore or gravel, and in the saving process, utilizes the water running through his sluices as power to operate the machinery required. He expects to save the fine free gold and sulphurets found in the tailings of that stream. A dam to direct the water through his sluices, his patented rifles, a concentrator operated by the water running through the sluices, and newly patented amalgamating process, constitute the appliances.

DOUGLAS COUNTY.

Near Glendale, the Cuines Creek G. M. Co., J. P. Rhodos, superintendent, has a 3-foot ledge of \$6 ore, developed by a 400-foot tunnel.

The Benton group, west of the Gold Bug, comprises nine claims. Developments are by four tunnels. The mine is being equipped with new machinery. R. A. Jones, superintendent.

JACKSON COUNTY.

L. B. Chase is developing the Palmer mine at Jacksonville.

Superintendent Morris of the Fish Lake Ditch Co., Jacksonville, says he can give employment to a number of men at \$2 a day.

A tunnel is to be driven at the Simmons & Cameron hydraulic mines, Waldo, to give way for a sluice and give access to a placer bed that cannot be reached in any other way. The tunnel will be 1250 feet in length, through solid rock. The managers of the Simmons & Cameron placers is putting in a hydraulic elevator and a new and larger pipe line on the Illinois river.

The Gold Bug, Mt. Reuben district, is having its equipment doubled by the addition of new boilers, hoists, compressors, engines and pumps. The Gold Bug is opened by tunnel and shaft 500 feet. Ore values run \$18 per ton in free gold and concentrates. The latter are treated by the cyanide plant. The tailings are cribbed up and run through the cyanide plant. S. Cole, is superintendent.

JOSEPHINE COUNTY.

The suit of E. McCann against the Althouse M. Co. resulted in no damages for plaintiff. The suit was to restrain defendant in the operation of a placer mine, and from damaging McCann by flowing water over his land and depositing mining debris and slickens. Judge Bellinger of the Portland U. S. Circuit Court held that plaintiff is not entitled to such relief, and the complaint was dismissed. The water used in the operation of the mine is taken from Althouse creek by a tunnel through a divide that separates the waters of that creek from Democrat creek. McCann owns 425 acres of land, which he values at \$10,000, and he complained that the water from the mines is filling up the channels of Democrat creek and the water is spread over his land, rendering it boggy and unfit for cultivation. Judge Bellinger reviewed the evidence at considerable length regarding the fact that witnesses for McCann testified that fifteen acres were covered with debris; others said ten acres. On the other hand, twelve witnesses—farmers, miners and others—testified that there is no debris on the land in quantity to injure it, and thirteen other witnesses testify to the same thing. Before starting the mine, the superintendent offered to levee all the low places on McCann's land, and offered to pay \$50 per acre for the land, and both of these offers were refused, and also an offer to repair a ditch running through the land. The preponderance of evidence, the court held, is against the claim of injury and damage, and the refusal of McCann to permit the defendant to build a levee along the ditch and improve it and keep it in repair, the court said, was unreasonable.

The Snelling-Alfred quartz mine, Galice Creek district, has been bought of C. Bradbury by men who will drive along tunnel to tap the ledge at greater depth.

LANE COUNTY.

High-grade ore from the Helena mine is hauled to the terminus of the railroad and shipped to the Tacoma smelter. The 10-stamp mill is crushing the free-milling ores from the upper tunnels. The Musick 10-stamp mill is in operation.

SOUTH DAKOTA.

LAWRENCE COUNTY.

F. T. Sanders of the Jupiter G. M. Co. is building a 100-ton cyanide plant at the Gustin mine, Blacktail gulch, 3 miles from Deadwood.

At Cyanide, camp of the Spearfish M. & M. Co., the Black Diamond No. 2 cut represents the summer's work, 325 feet in length; a slope, 50x100 feet, averaging 10 feet in height with three openings. The old work, Black Diamond No. 1, lies 1000

feet from this line, in reserve for winter work. Previous work on this ground has gone 450 feet into an 800-foot ore body, vein averaging 10 feet. Other work reserved for winter is on the Metallic, which lies within 150 feet of the cyanide plant and has been proved up, 35,000 tons having been taken out. The company will relay the track at the present work with thirty-pound rails. Black Diamond No. 2 is 2 miles from the mill.

The Gold M. Co. is drilling for quartzite at the Goodman shaft in Johnson gulch. The depth is now 275 feet.

The cyanide plant of the Deadwood-Standard, in the Ragged Top mining district, which has been closed down, is running again, 125 tons a day, and made a first clean-up on the 15th. Thirty men are working in the mine. T. R. Dunham of Deadwood is chemist; S. B. Morrison is superintendent. The work is principally surface work, with considerable prospecting.

The Kildonan cyanide plant of the Horseshoe Co. at Pluma is being increased from 100 to 300 tons a day. This was originally a chlorination mill and was converted to the cyanide process last spring. A new building is to be erected on the sidewalk above the present main building, and this, with the old roaster and cooler rooms, will be used as tank rooms. The tanks are to be of steel.

The August cleanup at the Kildonan mill resulted in a brick worth \$15,000, which was shipped to the main office at Milwaukee, Wis., last week. This represented the gold recovered in thirty days at the rate of 100 tons a day. This plant is receiving only the low-grade ores from the Horseshoe Co.'s Ruby basin and Bald mountain mines.

At Terraville, in the Pocahontas mill, formerly known as the Deadwood-Terra, the Homestake Co. is making renovation without closing the mill down. Twenty stamps are taken out at a time, and new foundations, mortars, battery posts, guides, etc., are put in. The interior of the mill will be virtually new. The new clarifying plant, the improvements on the Pocahontas and cyanide No. 2 are to be finished simultaneously and the whole in operation October 10.

PENNINGTON COUNTY.

At Rapid City the Horseshoe M. Co., owning the National smelter, will start it up next month. E. M. Holbrook, general manager Horseshoe M. Co., has been elected president National Smelting Co. Anson Highy, general superintendent of the company, is at Rapid City, supervising the renovation of the plant, preparatory to blowing in the furnaces. The Horseshoe Co. is making daily shipments of ore to Denver and other outside smelting points. These will continue the purchase of ore, the National smelter being intended only to increase the amount of ore treated.

E. C. Johnson, superintendent Gertie M. Co., has placed boilers, engine and other machinery at the shaft in Hill City. Sinking has been resumed to make the shaft 520 feet deep. The Gertie is the oldest mine in the county.

The Spearfish M. & M. Co. at Creston report the August production from that mine \$23,000. The entire process of mining and milling is performed on the property, the product being finished as gold bricks. The mining is carried on directly in the face of the bluff, the entire slope of the hill being allowed to fall after the tunneling has removed the mineral. A steam railroad traverses the property, carrying the ore into the mill.

YANKTON COUNTY.

At Gayville the Homestake cyanide No. 2 will be finished about October 15. In some respects cyanide No. 2 will be an improvement on cyanide No. 1 at Lead.

UTAH.

BEAVER COUNTY.

Superintendent Farnsworth of the Horn Silver, at Frisco, says sixty persons are employed, forwarding 200 tons a month to the smelters. He is sending out ores which maintain an average of 26% copper and others made to average 45% lead, with some silver and gold.

J. Fergie of Milford is manager Lady Curzon group, owned by the Beaver C. & G. Co., North Star district.

BOX ELDER COUNTY.

At Park valley the Century is now operating sixteen stamps. Richer ore is being opened up as work progresses. A good showing is being made in the Sunrise mine in its crosscut for the vein.

GRAND COUNTY.

Near Basin, Hammond & Thomson will do tunnel work on the Little Dot. The ore will be shipped by wagon out to Cisco and to Salt Lake City for reduction.

JUAB COUNTY.

In the Lower Mammoth at Eureka Superintendent Ball has connection with the west fissure on the 1100-foot level, and

is driving to tap the shoot on the 300-foot level. Two cars of ore from the new channel sold on controls showing 106 ounces silver, 5.4% copper and 80 cents gold—\$58.53 per ton.

The contract system has begun at the Centennial Eureka. The tramway, which has been idle for some time, has started up.

The Tribune hears that the management of the South Swansea of Silver City is arranging to start up again.

SAN JUAN COUNTY.

At Montecello, the Golden Dream has ores in value \$17 per ton. Manager Riggs has gone to New York to meet his company, to plan for extensive operations.

SUMMIT COUNTY.

The Nalldriver group, Park City, may be worked by Manager Rood of the Ontario.

At the California, Park City, Superintendent Gitsch has an ore body into which he has driven for 80 feet and a winze dropped for 20 feet. Average milling ores, 19% lead, seven ounces silver, 80 cents gold per ton; assays on the shipping ore, 70% lead, seventeen ounces silver and 80 cents gold, with the zinc reduced to 1.6%.

Supt. Brooks will double the capacity of the concentrator of the California M. Co. at Park City, to handle an average of 120 tons of crude ore daily.

The Park City Record reports the Anchor shaft completed. Foreman McSorley says the 500, 700, 1200 and 1400 levels will be developed on toward Bonanza Flat. The completion of this shaft enables the largest cars, double-deckers and all, to go up, enables the company to handle its coal, etc., through the Anchor tunnel and shaft, and puts the mining property in shape for economical and advantageous working. Material for the 300-ton mill is arriving and men are framing timbers for the structure.

TOOELE COUNTY.

The Sunshine mines and mill at Sunshine has gold dust from its cyanide plant of the value of \$6400, proceeds of a two weeks run, during which an average of 220 tons a day were put through.

Near Ophir, Superintendent J. W. Cairns of the Eureka-Ophir Con. mine has a 15 H. P. gasoline engine in operation. A postoffice is to be established there to be called Gisborn.

At the Four Metals mine in Dagway district, G. L. Moats, manager, the shaft is down 400 feet.

The Tribune notes the payment of \$45,000 by which control of the Galena King Co.'s mines at Stockton passed into the hands of Wisconsin men, of which D. McVichie is the resident representative. The properties, that a total of nearly \$100,000 has been required to buy, adjoin the Honerine at Stockton. Participating with D. McVichie in the purchase are J. H. Knight, J. C. Cochrane of Ashland, Wis., and I. Wing of Bayfield, Wis. The shaft by which the group has been opened is at a depth of 825 feet; it will be retimbered.

WASHINGTON.

FERRY COUNTY.

At Republic, the Zala M. Co. is hauling fifteen tons of ore per day to the Kettle Valley lines for shipment to the Granby smelter.

Regarding Republic, G. Pfunder states that shipping from resumption of work has created a better feeling. Ore from Republic will be shipped to the Granby smelter at Grand Forks, the B. C. smelter at Greenwood, the Standard at Boundary Falls and the Everett at Everett. He states that the highly siliceous nature of the Republic ores will make it difficult to secure an outlet for large tonnage at the present time, but he is satisfied that the experiments in reduction now under way will result in the evolution of a process best suited to the reduction of ores. Personally he is convinced that this process will consist of a preliminary roasting such as is practiced at Cripple Creek, Colo., followed by a crushing and cyaniding. Boundary smelters are giving Republic ores a \$5 rate for freight and treatment and Everett's rate is \$6, the difference being accounted for by the longer haul.

STEVENS COUNTY.

J. F. Hall has an option on the Frisco, Monarch and Big Strike quartz claims, on Fish creek, 12 miles from Boundary City.

WYOMING.

CARBON COUNTY.

At Grand Encampment the aerial tramway is about completed. The contract says the tramway is to be in operation Oct. 1.

The railroad survey from Encampment to Hog Park, via the South Fork of the Grand Encampment river, has begun.

Building the piers and laying the foundations for the concentrator is completed.

W. Bunce, the new superintendent Ferris-Haggarty mine, is inspecting the

workings at the mine and planning future development.

FOREIGN.

BRITISH COLUMBIA.

The Mines Exchange, Ltd., Nelson, under date of Sept. 13 reports that the 1902 returns from the Rossland camp will show a marked gain over last year. The sudden revival of interest is likely to affect the production from the camp which has of late averaged 5000 and 6000 tons weekly, to an output of 10,000 to 12,000 tons for the rest of the year. The Great Northern and C. P. R. are both prepared for heavy shipments with increased facilities now on the spot.

At Nelson the Ore Hill group on Sheep creek, owned by G. Birtsch, is to have a 5-stamp mill on the property.

H. Z. Beck, manager Camborne group, reports the right of way for the aerial tramway from the Gold Finch rich gold ore to the 10-stamp mill at Goldfields completed. Laying the cable is in progress. Men are erecting the stamp mill.

Shipments from the Rossland camp for the week ending September 13th and for the year to date are as follows:

	Week.	Year.
Le Roi.....	3,180	160,621
Le Roi No. 2.....	1,650	46,551
Center Star.....	1,612	9,232
War Eagle.....	961	3,546
Rossland G. W.....		2,400
Glant.....	200	1,945
Cascade.....		300
Columbia-Kootenay.....		30
Bonanza.....		90
Velvet.....	60	610
Spitzee.....		20
White Bear.....		5

Totals.....7,663 225,350

The Co-operative S. & R. Co. will erect a smelter 1 mile away from Golden, and thus will probably transfer the population of that place to the new townsite.

SOUTH AFRICA.

Rhodesia reports in June seven mines in operation; seventy-two stamps; total ore milled, 22,484 tons; average duty per day, 4.85 tons per stamp; total tailings cyanided, 13,761 tons in five plants; total yield in gold bullion: Mill, 12,923 ounces; tailings, 2528 ounces; miscellaneous, 91 ounces; total, 15,842 ounces. For the six months ending June 30 the total yield was 99,049 ounces crude, equal to 88,153 ounces fine gold, \$1,822,122.

THE KLONDIKE.

The Yukon Government is preparing to erect a stamp quartz mill for testing ores. For the first two months it will be free to miners. The Ladu Co. has ordered a 100-stamp mill which will be installed at the Lepine quartz mines, 15 miles from Dawson.

Dawson advices say that the Yukon Council has passed a labor law for the benefit of miners. Under it their wages will take precedence over everything save mortgages on record prior to its passage. The lack of such a law has been a great drawback as far as the miners were concerned. They have lost considerable in wages due from laymen, as neither claims nor output were held for wages.

Obituary.

At Colorado Springs, Colo., Sept. 14th, W. S. Stratton, owner of the Independence mine, Cripple Creek district, died after an illness of several months. He was born in Jeffersonville, Ind., July 22, 1848. He was educated in the schools of that city, and at the age of 17 took up the carpenter's and draughtsmen's trade, which he mastered. He had resided in Colorado Springs for thirty years. During all that time he had been interested in mining, being a prospector in various camps of Colorado as long as fifteen years before he opened the Independence bonanza. In April, 1891, having seen some specimens of gold ore from the Cripple Creek district that impressed him favorably, he went to that camp to prospect. On the 3d of July, after weeks of fruitless prospecting, a man who had agreed to grub-stake him having disappointed him, Stratton decided to go to Cripple Creek and stake out a claim on his own account. He rode the 35 miles from Colorado Springs to the camp on horseback, and on the morning of the 4th of July, 1891, staked out the Independence and Washington claims. The Independence gave him original assays of \$380 to the ton, and in 1892 he leased and bonded the Washington for \$80,000. The Independence yielded Stratton millions, and in 1898 was sold by him for \$10,000,000, he retaining a considerable interest after receiving the sum. He was a man whose private charities were boundless, and his interest in the public welfare without limit. His wealth is estimated at \$15,000,000.

Personal.

L. N. PARKS has charge of the Folsom, Cal., gold dredger.

S. A. BARRON is manager Federal smelter, El Paso, Tex.

E. L. GODBE has charge of the April Pool mill, De Lamar, Nev.

C. TIMMONS has returned from British Columbia to Prescott, Ariz.

N. GILLIS of Salt Lake, Utah, is examining mining property in Japan.

B. ROSS has resigned as manager Bertha M. Co., Idaho Springs, Colo.

LEE COCHRANE of the Mine & Smelter Supply Co. has gone to Mexico.

VICTOR M. CLEMENT has gone to New York, and goes thence to Mexico.

ROSS E. BROWNE has returned to San Francisco from Santa Barbara, Cal.

H. H. HICKS succeeds H. J. Sisty as superintendent Hite Con., Cal., mine.

W. MITCHELL succeeds H. Witteborg as manager Breckenridge, Colo., sampler.

M. B. KERR has been appointed manager Jumper mine, Tuolumne county, Cal.

F. M. DAVIS of the F. M. Davis Iron Works Co., Denver, Colo., is at Coronado, Cal.

J. K. FINDLAY, has been appointed manager Portland M. Co., Cripple Creek, Colo.

E. E. NOON is superintendent the Santa Rosalia mines, Arizpe district, Sonora, Mexico.

J. PENMAN is superintendent Verde Grande mines, near Hormosillo, Sonora, Mexico.

W. A. FARISH will take charge of the Majestic Co.'s smelter, Milford, Utah, Sept. 28.

C. PORTERFIELD is succeeded as manager Charlotte M. Co., Red Cliff, Colo., by C. W. Smith.

H. W. TURNER has returned to San Francisco from an inspection of mines at Eureka, Nev.

MR. WILLIS G. DODD is now vice-president of the Union Iron Works of San Francisco.

O. M. ROBERTS is general manager La Mina Henrietta, La Cienega, Altar district, Sonora, Mexico.

T. ELLIOTT, superintendent Smuggler mill, Telluride, Colo., has returned there from a northern trip.

F. F. SHARPLESS, formerly of the California Copper Co., is in charge of the Com. M. Selection Co., Honduras, C. A.

C. H. WITTENOOM, manager Millar's Karrie & Jarrie Co., West Australia, is inspecting Colorado mining conditions.

W. J. JOHNSTON, publisher Engineering and Mining Journal, has returned to New York after a ten days sojourn in California.

MANAGER A. BURCH of the Bunker Hill & Sullivan mines, Cœur d'Alene, Idaho, has returned there from Salt Lake, Utah.

PHILIP ARGALL and A. J. WARWICK have returned to Denver, Colo., from an examination of the Rosario mine, Guadalupe y Calvo, Mexico.

HENRY T. SCOTT of San Francisco has gone to New York City to take the chairmanship of the executive committee of the shipbuilding combine.

J. W. CHANDLER has resigned the superintendency of the Midas mine, Deep Creek, Utah, and will develop the St. Louis group, Nevada City, Cal.

S. LOEB, general superintendent; L. Glockner, superintendent ore department, and H. R. Jones, shift boss, Independence mine, Cripple Creek, Colo., have resigned.

LEO VON ROSENBERG of New York has gone to the west coast of Mexico and to Lower California, Mexico, to examine gold mining properties for New York people.

J. J. CHAMBERS has been elected vice-president of the Great Western Gold Co., Redding, Cal., in place of T. S. Henderson, resigned. Mr. Chambers retains the office of general manager.

C. W. L. FILKINS is the new professor of mining engineering at the Golden, Colo., State School of Mines. W. E. King has the chair of metallurgy and mining. C. R. Rose will have charge of the assay department.

Catalogues Received.

"Power Transmission Appliances," a handsome twenty-page booklet, with fine illustrated description of "Globe" hangers, post boxes, shaft couplings, pulleys, etc., manufactured and furnished by the Globe Iron Works, Stockton, Cal.

Latest Market Reports.

SAN FRANCISCO, Sept. 19, 1902.

METALS.

SILVER.—Per oz., Troy: London, 23½d (standard ounce, 925 fine); New York, bar silver, 51½c, refined (1000 fine); San Francisco, 51½c; Mexican dollars, 43½c San Francisco, 40½c New York.

The coinage executed at all the mints of the United States in August, 1902, amounted to \$10,487,110, of which \$8,040,000 was in gold, \$2,236,000 in silver and \$211,110 in minor coins. All the gold coinage was executed at the San Francisco mint. In addition, there were coined \$225,000 in five-bolivar and \$69,583 in two-bolivar for the Government of Venezuela, and \$231,944 in fifty-centavo pieces for the Government of Colombia.

COPPER.—New York: Standard, \$11.00@11.40; Lake, 1 to 3 casks, \$12.00; carload lots, \$11.60; Electrolytic, 1 to 3 casks, \$11.60; carload lots, \$11.40; Casting, 1 to 3 casks, \$11.50; carload lots, \$11.25. San Francisco: \$14.00. Mill copper plates, \$17.00; bars, 18@24c. London: £53 13s 6d spot per ton.

H. L. Casey, metal broker of New York, predicts that the maximum price for copper for the next three years will be about 12 cents per pound, as, according to his figures, the surplus stock of copper on hand in America Sept. 1, 1902, amounted to 220,469,760 pounds, and will not induce Europeans to bid very high for such a surplus. Mr. Casey states that the production of copper during the past five months has increased 18.12%, as compared with a corresponding period in 1901.

LEAD.—New York, \$4.12½; Salt Lake City, \$3.50; St. Louis, \$4.00; San Francisco \$4.50, carload lots; 4½c 1000 to 4000 lbs.; pipe 5½, sheet 6, bar 5½c; pig, \$4.75. London: £10 18s 9d per ton.

SPELTER.—New York, \$5.50; St. Louis, \$4.50; London, £19 7s 6d per ton; San Francisco, ton lots, 6½c; 100-lb lots, 7c.

ANTIMONY.—New York, Cookson's, 9½c; Hallett's, 8½c; San Francisco, 1000-lb. lots, 10c; 300 to 500 lbs., 11c; 100-lb. lots, 13@15c.

TIN.—New York, pig, \$26.35; San Francisco, ton lots, 29c; 1000 lbs., 29c; 500 lbs., 29c; 200 lbs., 29½c; less, 30c; bar tin, 3½c. London, £121 15s spot.

PLATINUM.—San Francisco, crude, \$18.00 ½ oz.; New York, ingot, \$19.00 per Troy oz. Platinum ware, 75@80c per gram.

QUICKSILVER.—New York, \$48.00 large lots; London, £8 15s; San Francisco, local, \$46.00 ½ flask of 76½ lbs.; Denver, \$49.65. Export, \$44.50.

BABBITT METAL.—San Francisco, No. 1, 10c; No. 2, 7c; No. 3, 6½c; extra, 17½c; genuine, 35c; Eclipse, 37½c.

ALUMINUM.—New York, No. 1, 99½ pure ingots, 35c; No. 2, 90½, 30c to 34c.

SOLDER.—Half-and-half, 100-lb. lots, 19.50c; San Francisco, Plumbers', 100-lb. lots, 16½c.

NICKEL.—New York, 50@60c ½ lb.; ton lots, 45@48c.

STRUCTURAL MATERIALS.

IRON.—Pittsburg, Bessemer pig, \$22 50; gray forge, \$20.50; San Francisco, bar, 3c ½ lb., 3½c in small quantities.

STEEL.—Bessemer billets, Pittsburg, \$31 and \$31.50; open hearth billets, \$33 and \$34; San Francisco, bar, 7c to 12c per lb.

CHICAGO CURRENT QUOTATIONS.

Bessemer.....	\$24.00@24.50
Foundry Northern 1.....	23.00@24.50
Northern 2.....	22.50@24.00
Northern 3.....	22.00@23.50
Southern 1.....	22.15@22.65
Southern 2.....	21.00@21.65
Southern 3.....	21.00@21.15
Forge.....	20.00@20.65
Charcoal.....	25.00@24.50
Billets, Bessemer.....	33.00@34.00
Bars, iron.....	1.85@1.95
Bars, steel.....	1.75@1.85
Rails, standard.....	28.00@30.00
Rails, light.....	34.00@40.00
Plates, boiler.....	1.90@2.00
Tank.....	1.75@1.80
Sheets, 26 store.....	3.25@3.40
No. 27.....	3.35@3.50
No. 28.....	3.45@3.60
Angles.....	1.75@1.80
Beams.....	1.75@1.85
Tees.....	1.80@2.00
Zees.....	1.75@2.25
Channels.....	1.75@2.25
Steel melting scrap.....	19.50@20.00
No. 1 railroad wrought.....	21.00@22.00
No. 1 cast, net ton.....	16.50@17.00
Iron rails.....	24.00@25.00
Car wheels.....	21.00@22.00
Cast borings.....	10.00@10.50
Turnings.....	14.00@14.50

CEMENT.—Germania, \$2.45; K. B. & S., \$2.80; Hewmoo, \$2.75; Trowell, \$2.75; Portland, \$3.00 per bbl.

LIME.—Santa Cruz, \$2.00; Roche Harbor, \$2.00 per bbl.

LUMBER.—(Retail): Pine, ordinary sizes, \$20.00@22.00; extra sizes higher; redwood, \$22.00@23.00; lath, 4 feet, \$4.25 @4.50; pickets, \$19.50; shingles, \$2.35 for No. 1 and \$2.00 for No. 2; shakes, \$13.50 for split and \$14.50 for sawed; rustic, \$26.00 @32.00.

NAILS.—Per keg (list prices): No. 20d to 60d, Wire, \$3.30; Cut, \$3.30; 10d to 16d, Wire, \$3.35; Cut, \$3.35; 8d, Wire, \$3.40; Cut, \$3.40; 6d and 7d, Wire, \$3.50; Cut, \$3.50; 4d and 5d, Wire, \$3.60; Cut, \$3.60; 3d, Wire, \$3.75; Cut, \$3.75; 2d, Wire, \$4.00; Cut, \$4.00. Special rates for carload lots.

GENERAL SUPPLIES.

POWDER.—F. o. b. San Francisco: No. 1, 70% nitro-glycerine, per lb., in carload lots, 15½c; less than one ton, 17½c. No. 1*, 60%, carload lots, 13½c; less than one ton, 15½c. No. 1** 50%, carload lots, 11½c; less than one ton, 13½c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2* 35%, carload lots, 9½c; less than one ton, 11½c. No. 2** 30% carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 728 kegs, \$1.50 per keg; less car lots, \$2 per keg.

CAPS.—3x, \$5.50 per 1000; 4x, \$6.50; 5x, \$8; Lion, \$9, in lots not less than 1000.

FUSE.—Triple tape, \$3.60 per 1000 feet; double tape, \$3.00; single tape, \$2.65; Hemp, \$2.10; Cement No. 2, \$3.00; Cement No. 1, \$2.65, in lots of 3000 feet and up.

CANDLES.—Granite 6s, 16 oz., 40s., 10c ½ set; 14 oz., 40s., 9c.

COAL.—San Francisco, coast, yard prices: Wellington, \$8; Seattle, \$6.50; Coos Bay, \$5.50; Southfield, \$8.00. Cargo lots, Eastern and foreign: Wallsend, \$7.00; Brymho, \$7.50; Pennsylvania, hd., \$14.00; Scotch, \$8; Cumberland, \$12; Cannel, \$9.50; Welsh Anthracite, \$13.00; Rock Springs, \$9.50, long ton; Colorado Anthracite, \$14.00. Coke, \$10.50 per ton in bulk, \$13 in sacks; Sunnyside, \$8.50, long ton.

CHEMICALS.—Cyanide of potassium, 98%-99%, jobbing, 27@28c ½ lb.; carloads, 25@26c; in 10-lb. tins, 38c; sulphuric acid, in carboys, 68% B, 2c ½ lb.; soda ash, \$2.00 ½ 100 lbs.; hyposulphite of soda, 2½@3c ½ lb.; blue vitriol, 5½@6½c ½ lb.; horax, concentrated, 7@8c ½ lb.; chlorate of potash, 12@13c; roll sulphur, 3c; alum, \$2.00@2.25; flour sulphur, French, 2½@2½c; California refined, 2@2½c; nitric acid, in carboys, 8c ½ lb.; caustic soda, in drums, 3@4c ½ lb.; Cal. s. soda, bbls., \$1.25 @1.50 ½ 100 lbs.; s. s. soda, bbls., \$1.25 @1.50 ½ 100 lbs.; s. s. soda, bbls., \$1.25 @1.50 ½ 100 lbs.; nitrate of potash, in bbls, 8c; caustic potash, 10c in 40-lb. tins; sulphide of iron, 9c ½ lb.

OILS.—Linseed, boiled, hbl., 57c; cs., 62c; raw, bbl., 55c; cs., 60c; lots of 5 bbls., 1c less; Lucol oil, hbl., 50c; cs., 55c; raw, hbl., 48c; cs., 53c. Kerosene—Pearl, per gal., 20c; Astral, 20c; Star, 20c; Extra Star, 24c; Eocene, 25c; Elaine, 22c; Water White, in bulk, 13½c; Mineral Seal, iron bbls., 19c; wooden bbls., 22½c; cs., 25c; Mineral Sperm, cs., 26½c; Deodorized Stove Gasoline, bulk, 17c; do., cs., 23½c; 86° Gasoline, bulk, 21c; do., cs., 27½c; 63° Naphtha or Benzine, deodorized, in bulk, per gal., 16c; do., in cs., 22c; Lard Oil, No. 1 hbl., 95c; cs., \$1.05; Neatsfoot Oil, hbl., 70c; cs., 75c; No. 1 hbl., 52½@55c; cs., 57½@60c; Sperm, crude, 60c; Natural White, 65c; Bleached do, 70c; Whale Oil, cs., 55c.

WHITE LEAD.—Per lb., in kegs: Five tons and over at one purchase, per lb., 6c; 1 ton and less than 5 tons, per lb., 6½c; 500 lbs. and less than 1 ton, per lb., 7c; less than 500 lbs., per lb., 7½c; in 25-lb. tin pails, 4c per lb. above keg price; in 1 and 5 lb. tin cans, 100 lbs. per case, 2½c per lb. above keg price. Dry Lead—In bbls., 1 ton and over, 6c; do. in kegs, 6½c.

RED LEAD AND LITHARGE.—One ton and over at one purchase, per lb., 6c; 500 lbs. and less than 1 ton, per lb., 6½c; less than 500 lbs., 7c.

ASSAY LITHARGE.—Per lb., 8½c.

BISMUTH.—Subnitrate, per lb., \$1.60.

BONE ASH.—4c ½ lb.

BORAX.—Crystal, 7c; calcined, 25c.

CHROMIUM.—(90% and over) per lb., \$1.25.

COPPER.—Carbonate, 20c; Red oxide, ½ lb., 60c.

MAGNESIUM.—Per lb., \$3.00.

MANGANESE.—(90% and over) ½ lb., \$1.25.

MERCURY.—Bichloride, ½ lb., 90c.

MOLYBDENUM.—25c. ½ gramme; 1000 grammes—2½ lbs.

PHOSPHORUS.—(American) ½ lb., 80c.

SILVER.—Chloride, ½ oz., 75c; nitrate, 55c.

SODIUM.—Metal, ½ lb., \$1.00.

URANIUM.—Oxide, ½ lb., \$3.50.

ZINC.—Metallic, chemically pure, ½ lb., 50c.

ZINC.—Dust, ½ lb., 10c.

ZINC.—Sulphate, ½ lb., .04c.

(These prices are wholesale, f. o. b. San Francisco, unless otherwise noted.)

Commercial Paragraphs.

THE Simonds Saw Co. has moved to the new four story and basement brick building 31 Main street, San Francisco, with increased facilities for handling the stock of saws, pulleys, Morse pumps, etc.

THE Pennsylvania Salt Manufacturing Co. of Wyandotte, Mich., has purchased a number of direct-current motors from the Westinghouse Electric Manufacturing Co., for installation in its plant at Wyandotte.

THE New York office of the Colorado Iron Works Co., Denver, Colo., has closed a contract with O. A. Turner for a 40-stamp amalgamating mill for the Mojave G. M. Co. of Arizona, 14 miles from Needles, Cal.

THE Krogh Manufacturing Co. of San Francisco is building an 18-inch patent hydraulic dredging pump for the Hackett dredger, which will be used for deepening the hay channel and for filling work. They also manufacture these pumps for gold dredgers. The Hackett dredger has a capacity of 350 cubic feet of solid material per hour, and is similar to one called the Olympia, installed by the company for the West Coast Dredging Co., which has made the longest continuous run of any on this coast. The company is also making changes on the Merritt, another of the West Coast Co.'s dredgers. Two 60 H. P. boilers and steel casings are to be added.

In the annual report of the American Smelting & Refining Co., submitted at the recently held annual meeting of the stockholders, the gross earnings for the fiscal year ended April 30, 1902, are computed at \$7,038,681, which compares with \$5,988,049 in 1901, a gain of \$1,150,632. After deducting fixed charges, which called for \$2,177,062, there was a total surplus of \$4,251,968, an increase of \$361,619. The earnings by quarters were as follows: First quarter, \$1,510,710; second quarter, \$1,728,392; third quarter, \$1,795,222; fourth quarter, \$2,004,357. The surplus after preferred dividends is equivalent to less than 3% on the common stock. The total net surplus is equivalent to about 6% on the common stock.

New Patents.

DEWEY, STRONG & Co.'s SCIENTIFIC PRESS PATENT AGENCY, 330 Market St., S. F., has official reports of the following U. S. patents issued to Pacific coast inventors:

FOR THE WEEK ENDING SEPTEMBER 9, 1902.

708,691—OIL BURNER—G. W. Arper, Oakland, Cal.
708,697—LETTER RECEPTACLE—D. F. Bennett, Redding, Cal.
708,693—HYDRAULIC NOZZLE—P. Bouery, Weaver, Cal.
708,755—ELEVATOR—M. A. Clennam, S. F.
708,586—GAS GENERATOR—E. R. Cook, Sacramento, Cal.
708,696—PACKAGE—E. H. Davis, Mesa Grande, Cal.
708,826—ELEVATOR—L. W. Dexter, San Jose, Cal.
708,820—WINDOW SHADE CARRIER—A. W. Ellis, Sumpter, Or.
708,702—BOX FASTENING—E. Fletcher, S. F.
708,632—REGISTER AND ALARM—L. E. Fugate, Seattle, Wash.
708,975—BAKERS' OVEN—C. E. Glafke, Los Angeles, Cal.
708,693—PERFORATING PIPES—E. R. Graham, Bakersfield, Cal.
708,707—KILN—Gray, Gray & South, S. F.
708,708—ELECTROSEPARATOR—A. W. Harrison, Los Angeles, Cal.
708,881—BORING MACHINE—B. E. Harvey, Ritzville, Wash.
708,826—GAS GOVERNOR—D. E. Hodges, S. F.
708,893—OIL BURNER—C. G. Lundholm, San Bernardino, Cal.
708,896—SPRING HINGE—E. Mathis, Miles, Or.
708,908—RAILWAY RAIL JOINT—T. C. McLin, Seattle, Wash.
708,899—CAR FENDER—E. C. Moulton, San Jose, Cal.
708,913—HAT—A. Olson, San Diego, Cal.
708,594—MESSAGE BOX—A. F. Shriver, Arbuckle, Cal.
708,671—TELEPHONE MONTH PIECE—Smith & Woolsey, S. F.
708,975—PHOTO CARD MOUNT—P. J. Stuparich, S. F.
708,976—HARNES—J. T. Surbaugh, Arbuckle, Cal.
708,978—OIL BURNER—O. Tillman, San Jose, Cal.
708,599—AMALGAM TRAP—G. R. Tuttle, Grass Valley, Cal.

SPECIAL MEETING.

A Special Meeting of the Stockholders of the MAY DAY GOLD AND SILVER MINING COMPANY, a corporation, will be held at the office of the Company, at Heald's Business College, No. 24 Post St., San Francisco, California, on Wednesday, the 8th day of October, 1902, at the hour of 1:30 o'clock P. M., for the purpose of voting for the voluntary dissolution of said corporation.

By order of the Board of Directors.

E. H. STEARNS, Secretary.



H. E. SKINNER CO.
416 Market Street, San Francisco.

Firearms and Sporting Goods.

ALL THE STANDARD MAKES AND LATEST IMPROVEMENTS.

SEND 4 CENTS FOR NEW CATALOGUE.

MINING AND SCIENTIFIC PRESS

Whole No. 2201.—VOLUME LXXXV.
Number 13.

SAN FRANCISCO, CAL., SATURDAY, SEPTEMBER 27, 1902.

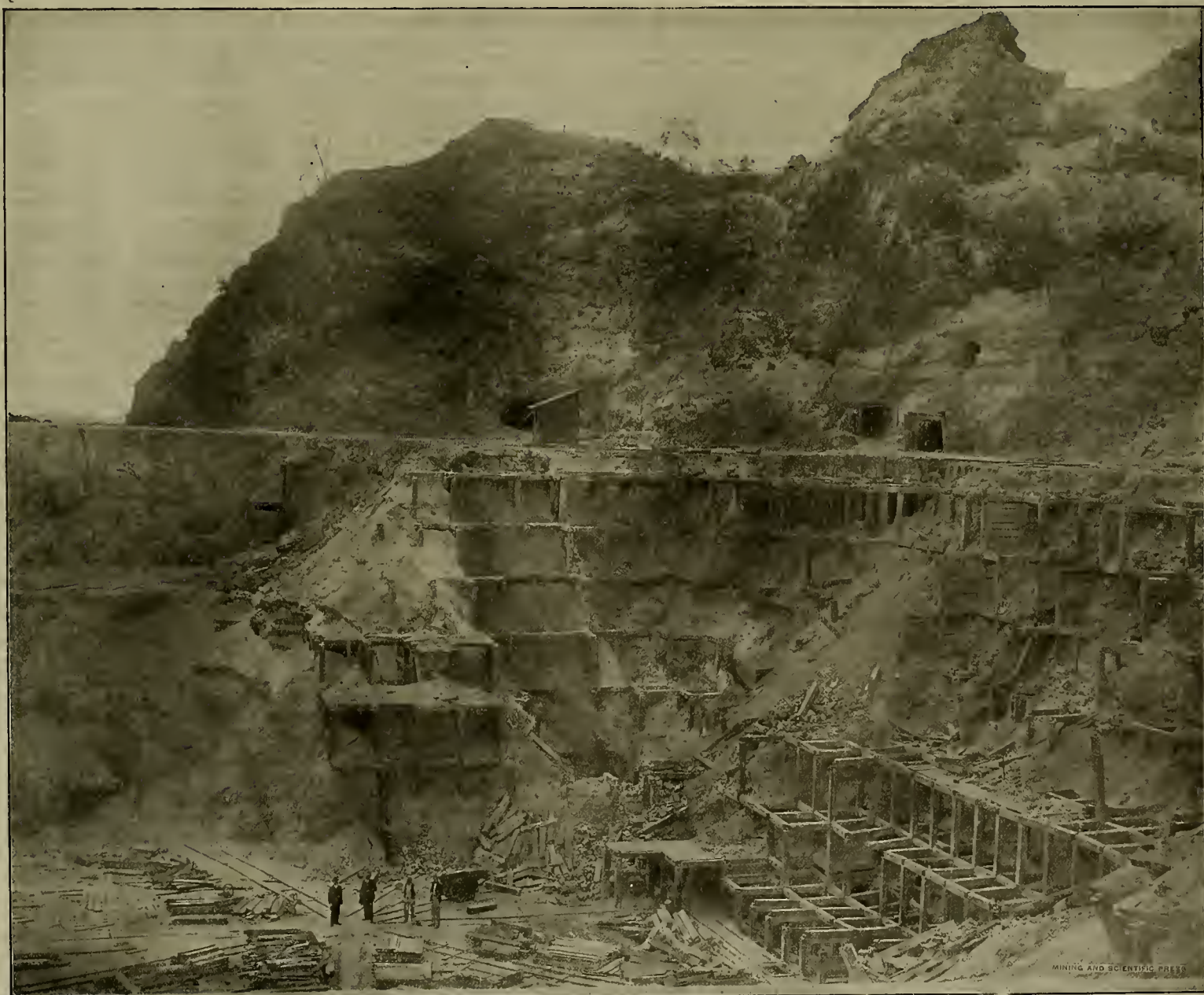
THREE DOLLARS PER ANNUM.
Single Copies, Ten Cents.

USUALLY in the case of a broken crankshaft from a gas engine, it breaks at the junction of the cheek with the shaft on which is placed the flywheel, and always gives the appearance of a flaw, there being a bright place showing a fresh break, and a larger, smooth portion, showing an old break, which, to a casual observer, looks just like a flaw. On the cheek this break appears as a cup-shaped indentation, the shaft showing a projection which snugly fits into the depression in the crank. It looks as though the shaft had been welded into the cheek and only a part of it properly done, and that the shaft has held on with only a very small section. But these shafts are not welded, being forged from a solid piece of steel. As a matter of fact, the ordinary cause of this



View of the Works of the Mount Morgan Mine, Queensland, Australia. (See Page 174.)

breakage is the lack of proper adjustment of the engine by the operator, causing the engine to work against itself, which starts a slight check or crack at the juncture of the cheek and the shaft. This crack gradually works around the shaft and inward, and, as it does so, naturally, the oil from the engine follows and in the vibration of the crankshaft causes the break to wear smooth. After a while the break has worked in so far that there is not enough of the steel left to stand the strain, and it breaks, this last section of the fracture showing bright; the greater part of the break, appearing old and smooth, gives the whole thing the look of a flaw, when it is really only an old and long-continued crack, which has been for some time working in farther and farther.



Top of Mountain, Taken From West Side, Mount Morgan, Queensland, Australia, Showing System of Timbering by Means of Square Sets. (See Page 174.)

MINING AND SCIENTIFIC PRESS.

ESTABLISHED 1860.

Published Every Saturday at 330 Market St., San Francisco, Cal.
TELEPHONE, DAVIS 771.

ANNUAL SUBSCRIPTION:

United States, Mexico and Canada.....\$3 00
All Other Countries in the Postal Union.....5 00

Entered at the San Francisco Postoffice as second-class mail matter.

Chicago Office (Telephone, Harrison 73).....737 Monadnock Block.
Denver Office (Telephone, Olive 733).....606 Mack Block.

J. F. HALLORAN.....Publisher.

San Francisco, September 27, 1902.

TABLE OF CONTENTS.

ILLUSTRATIONS.—View of the Works of the Mt. Morgan Mine, Queensland, Australia; Top of Mountain, Taken from West Side, Mt. Morgan, Showing System of Timbering by Means of Square Sats, Queensland, Australia, 171. Gamhetta Mine, Madera, Cal., 176. Mining and Metallurgical Patents, 178.

EDITORIAL.—Broken Crankshaft From Gas Engine, 171. Railroad to Angels, Cal.; Relation Between Electricity and Magnetism; Gold Dredging on This Coast; Evolution of the California Stamp Mill; Royalties at Cripple Creek, Colo.; First Blast Furnace on the Pacific Coast; Interesting to Silver-lead Miners; Arrangement Between the Cœur d'Alene Silver-Lead Miners and the Smelting Trust; The Day of the Poor Man in Mining, 172.

LATEST MARKET REPORTS—183.

MINING SUMMARY.—172-183-181-182.

MISCELLANEOUS.—Concentrates, 173. The Treadwell Mine, Alaska; The Mt. Morgan Mine, 174. Notes on Machinery Constituting a Mining Plant, 175. Of Historic Interest, Present Cyanida Practice, 176. The Gold Production of North America, Its Geological Derivation and Probable Future; Strike at the Gamhetta, Cal., Mine; Rock Drill as Blacksmith Hammer; Water Measurement in the Yukon, 177. Mining and Metallurgical Patents, 178. Personal; Commercial Paragraphs; Books Received; Catalogues Received; Obituary, 183. New Patents; Notices of Recent Patents, 15.

The advent of the railroad this week into the old historic town of Angels, Cal., exemplifies the new era in California gold mining, and the advance from "the days of '49," when that locality was made famous in song and story. The vicinity of Angels is still turning out gold in 1902, as in 1849, the only difference being that deep quartz mining supersedes surface mining, and the building of a railroad to that town fittingly emphasizes its continuous richness and importance.

A FINE ILLUSTRATION of the relation between electricity and magnetism is afforded in the current of electricity produced in a wire moved in the vicinity of a magnet. What is called a field of magnetic force exists between the two poles of a horseshoe magnet. A loop of wire so disposed that it will revolve within such field will have an electrical current generated therein. On this fact or effect rests all modern dynamos and motors, from the 5000 H. P. generator at Niagara to the little generator in the telephone.

ABOUT six years ago gold dredging on this coast was made a prominent subject and that evolutionary process of gold mining began to take on considerable proportions. In California, Colorado and Oregon, as in Montana, dredging for gold has now made the yield of gold so produced a factor of some importance in the annual gold output, and areas that Chinese forsook twenty years ago are now affording handsome profit. From the Cœur d'Alenes come accounts of installation of gold dredgers, and the field is widening. No form of gold mining is on a surer basis. With care in the selection of ground, proper sampling of the whole area proposed to be dredged, and skillful operation of the proper dredger, the element of chance is almost wholly eliminated; the matter sifting down to a commercial proposition of cost, expenses and net profit.

THERE is a constant discussion in British Columbia, interesting to silver-lead miners everywhere, as to what producers there shall do under certain conditions, those conditions being the U. S. tariff and the restriction of the American Smelting & Refining Co. The latest from the northern province is a projected revision of the tariff. There also seems to be hopes of some adjustment of U. S. lead mining conditions as between purchasers and producers that may accrue to Canadian profit, though the latest patched-up arrangement between the smelting combine and the Cœur d'Alene lead miners does not afford much present aid or comfort. There are a few things to be borne in mind. There is no U. S. market for Canadian lead. A European market seems impossible because of transportation and insurance charges. The Oriental market is a peculiar one. There exists a certain limited demand there for a specially

refined lead for native use as "tea lead," this soft, specially prepared lead being largely furnished by the Selby Smelting & Lead Co. of San Francisco and the Broken Hill Proprietary Co. of Australia. The claim that the different lead products can be manufactured in Canada and there find a home market is not borne out by the Minister of Mines' report of an annual production of 60,000,000 pounds of lead and an annual consumption of lead products of 25,000,000 pounds, though in the last project lies largely the ultimate solution of the problem of Canadian mines—what to do with their surplus lead product.

ON page 176 of this issue appears an article solicited from Mr. Irving M. Scott of the Union Iron Works of San Francisco, Cal., on sundry points in the evolution of the California stamp mill as suggested in the issue of August 9th in an article by M. P. Boss, another past grand master in the art. In the article on page 176 Mr. Scott clearly shows the characteristic attention to detail and painstaking effort that led up to the improvement specified. Not the least in interest is his account of the evolution of the amalgamating pan, which greatly adds to the value of Mr. Scott's historic article. We may be pardoned for suggesting that when the manager of the establishment that "huilt the Oregon" can find time to minutely detail matters as he so clearly sets forth, the fact is worth commending to the attention of men who sometimes say they are "too busy" to write. Yet there is probably no busier man in the United States than the author of the article on page 176.

CRIPPLE CREEK, COLO., mining ground owners have been charging good round royalties until lessees on their part have begun to be obliged to gouge the eyes out of the mine in some instances to pay what is required. It is a clear case of supply and demand, and as long as there are three sets of lessees to one piece of leasing ground companies will naturally get all they can from leasers, up to 30% on \$25 ore. But sooner or later that must stop, and it is now becoming a question for all to consider. So far, leased ground on the whole has been worked in minerlike fashion, but if fancy figures must be paid, leasers can not be expected to do the dead work, and development work that always goes with ore extraction in a rightly worked mine. The action of some Cripple Creek mine owners retards the district, hinders development and puts a premium on gophering. In the long run, or short run, this hurts the owners of the property and isn't business. It always pays to treat the other fellow right and give him a chance to make something out of his work.

AT Irondale, 5 miles south of Port Townsend, Wash., the first blast furnace on the Pacific coast was built in 1877, but proved a failure after some years and was finally abandoned by the Puget Sound Iron Co., about twelve years ago. In 1898 the Pacific Coast Steel Co. bought the plant, relined the furnace, put in machinery for crushing and handling the iron ore and operations are resumed. The furnace is 50 feet high, 12 feet in the hosh, 6 feet on the crucible, and has a daily capacity of fifty tons of iron. Four steam hoilers furnish power to drive the ore-crushing and hoisting machinery and the blowers. Hot blast is used, the air entering the furnace through five tuyeres at a temperature of 950° F. The ore is brought on scows 130 miles from Texada Island, B. C., the coke on scows from Skagit, Wash. There is also a charcoal-making plant, twenty kilns, each 30 feet high, 30 feet diameter at the base, capacity seventy-five cords of wood. The kilns are filled with wood automatically at a cost of 54 cents per cord. The operators are producing a good grade of iron with ready sale therefor.

THE arrangement reported on page 180 between the Cœur d'Alene silver-lead miners and the smelter trust is a mutual compromise and concession, as such arrangements usually are, though some present advantage seems to have been gained by the miners. The policy of the smelter combine has been to reduce the Cœur d'Alene output in an effort to sustain the lead market. Idaho producers frankly told the smelter combine that if more satisfactory terms could not be secured the result would be an independent smelter and refinery, with the result as detailed on

page 180. It is believed, however, that this arrangement only partakes of the nature of a temporary truce, and that sooner or later silver-lead producers in the Cœur d'Alenes, Colorado, and elsewhere must work out their deliverance in the manner previously outlined herein. Under present conditions the natural order of things is reversed. While the Bunker Hill & Sullivan sends its ores to this coast, the rest of the local lead mines are dependent upon the combine. Naturally, and in a general way, lead smelting is made subordinate to lead mining. As things are in relation to the smelter combine, smelting is the one great controlling factor, production itself being merely secondary and incidental. The miners have little to say; the smelter monopoly sets the price, makes the terms of contracts, buys or refuses to buy and acts just about as the principal part of the business—mining itself—would act; a case of the tail wagging the dog. It is as if a draughtsman in the employ of a mining machinery company were to get to such a point as to be able to dictate what the prices and terms of sale of machinery should be. Of course, this is a condition not in accord with the basic principles of business and one that can not permanently go on. The main point lies in the manifest fact that where the minor becomes the major premise in a business argument or arrangement such arrangement is unfair, and, therefore, can not last, for no man or men will stand having the worst of a bargain if they can help themselves, and as in this case they can help themselves, and really have the strength of the game, they will not endure having the market value of their mines and products controlled and regulated by the smelter monopoly just as completely and effectually as the smelter combine controls and regulates its own investments.

It is being said in many Eastern journals and not a few Western ones that the day of the poor man in mining is gone by; that no one but a big corporation can succeed in mining any more; that it takes big capital to do anything; that most of the good mining propositions are controlled by trusts or millionaires and that there is no longer opportunity for a man with a little money. This is all a mistake. The day of the "poor" mining man was never brighter nor greater than right now. If he be a gold miner he can get supplies of all kinds 50% cheaper than he could a generation ago, while he will get just as much per ounce for his gold as when everything he used cost just twice what it does now. Every old miner will hear us out in that statement. The cry that no one but a big corporation can succeed now is no truer now than it was fifty years ago, when, if an adventurous miner wanted to turn the head of a California river or bring water 20 miles or turn a hill upside down, he had to do just what miners of this generation do—combine to get enough money to make the thing a go. The complaint that it takes big capital to do anything is given contradiction by the flat fact that countless good mines from Republic, Wash., to Bisbee, Ariz., are owned and worked profitably by the men who prospected them from the start, these mines having paid their way from the grass roots. The assertion that most of the good mines are owned by trusts or millionaires is heard most often, but there is least in that of any of the pessimistic utterances. One hears of the big millionaire owners more than he does of the thousands of substantial companies that go right on with little notoriety paying good wages and monthly yielding dividends. Finally, it may be justly said in answer to the assertion that opportunity no longer exists for the man with a little money, that never in the world's history were there finer opportunities in mining for the man with a little money than in this west half of America to-day. In the one State of California it was recently figured that there were 17,000 "prospects," undeveloped mines, unmade—for mines are made—awaiting a little more to make them profitable. Doubtless were a similar census taken in other American commonwealths, there would be a proportional aggregate. Of course, not all of these, not probably one in ten would or could be developed into a "going" mine, but the opportunity exists for the man with moderate capital, and opportunity is all that the go-ahead man has ever asked any time, anywhere. And a little capital coupled with good judgment, as against "big" capital and no judgment or skill, will win in mining every time.

Concentrates.

COPPER will slowly combine with mercury when immersed in it. Iron is unaffected by mercury.

Ore giving a return of 10% and less of metallic lead to the ton is usually considered a dry ore, and over 10% a wet ore.

THE percentage of ashes from a given weight of coal is found by dividing the weight of the ashes in pounds by the weight of coal that produced the ashes.

AT 68° F. the resistance of No. 36 B. & S. copper wire is 2414 feet per ohm. It will carry nearly three amperes in the open air without charring the insulation.

IN an air compressor, at 100 pounds gauge pressure, 1 cubic foot corresponds with 7.82 cubic feet free air; at 80 pounds pressure, to 6.46 cubic feet; at 60 pounds, 5.10.

LEACHING of silver ore by sodium hyposulphite is ordinary metallurgical practice. This office furnishes what is considered the best practical work on that subject—Stetefeldt's.

To calculate the horse power of a windmill, approximately, multiply the area of the sails in the plane of revolution by the cube of the velocity of the wind in feet per second, and divide product by 4,000,000.

ORDINARILY a team of horses will travel at a walk 25 miles in ten hours, a speed of 220 feet per minute. A man can load with a shovel about 15 cubic yards—place measurement—of ploughed earth in ten hours.

SIX drilling machines 3 miles from the air compressor would require, approximately, 450 cubic feet free air per minute. If this amount of air is transmitted through a 4-inch line at 100-pounds gauge pressure, the loss would be about 15%.

A **REDUCING VALVE** is about the same thing as an automatic throttle, reducing the steam pressure to any desired degree. This pressure is thus regulated by a spring, or compressed by a screw, or, in other styles, by a lever and weight.

ANTIMONY, arsenic, bismuth, iridium, iron, lead, gold, silver, copper, platinum, mercury, tellurium and zinc have all been found in a native state, the zinc near Melbourne, Australia, the lead at Franklin, N. J., and in the Ray mine, Arizona.

THERE are several great gold producing properties in southern California, among others the Golden Cross in San Diego county; the Yellow Aster, Kern county; the Exposed Treasure, also in Kern county; the Gold Mountain, San Bernardino county; the Dean and Jones, in Inyo county.

FOR station work and for flows of over 1000 gallons a compound pump is most effective. A compound station pump with condenser will ordinarily cost, laid down from \$1.60 to \$2.20 per gallon per minute capacity against 300-foot head, and about 30% more against 400-foot head, from 12 cents to 16 cents per pound weight of machinery.

A **STEAM JACKET** of correct design and properly applied and managed will heat up the cylinder surfaces to the temperature of the steam at boiler pressure, thus preventing the condensation of the inflowing steam both before and after expansion takes place, and in this manner save from 20% to 25% of steam at initial cylinder pressure, showing its value as a fuel saver.

OWNERS of valid mining locations made and held in good faith under the mining laws of the United States and the regulations thereunder are authorized and permitted to fell and remove from such mining claims any timber growing thereon, for actual mining purposes in connection with the particular claim from which the timber is felled or removed.

If a tool dresser is compelled to use sulphurous coal it can be counteracted a little by turning on the blast rather strong, and when the coal is all coked and fairly glowing the blast can be turned off and a piece of iron laid in the fire which will collect most of the sulphur, which he will notice to be a coat of white or yellow on the piece of iron; if necessary, repeat the operation until the fire is reasonably free from the deleterious element.

IN the case of the Bunker Hill & Sullivan Co. vs. Empire State-Idaho M. Co., 106 Fed. Rep., 471, the U. S. Circuit Court for the district of Idaho decided that for the purpose of locating a mining claim with parallel lines parts of the lines may be within another claim, though within the overlaps the rights of the other claim prevail. The senior claim having within its surface a part of the width of the apex owns the entire width of the ledge.

ALL calculations of energy consider rest as the zero of motion. Gross matter is destitute of self-moving force. It is inert. Hence inertia is that property of matter that makes it resist change of position when at rest, or change of direction when in motion, and which requires a countervailing force to bring it again to rest. Inertia is the persistence of mass in any state imposed upon it by force. Force is the cause of energy, and is that which produces motion or tends to produce it.

IT is a little late to institute comparisons commendatory or condemnatory as to the relative merits of electricity and compressed air in mining operations. They are not competitors, but coadjutors. There are cases when either one is better than the other. The point is to determine in the particular case mentioned whether it were more economical or practicable to use water power,

steam, electricity or compressed air, or any two or all, and to let it go at that. From the data presented from the Montana Inquirer steam power would appear to afford the greatest possibility of present profit.

THE WATT, the unit of electrical power, is $\frac{1}{4}$ of a horse power. It equals the mechanical energy represented by 4424 foot pounds. One ampere of current moving under the influence of one volt pressure, or any combination of volts and amperes, and that will make unity when multiplied together, is the equivalent, in the expenditure of energy to the work a man would do in lifting one pound 44.24 feet high, or any work, any weight raised any distance, in which the weight and the distance multiplied together make 44.24.

THE thermometer marks the temperature, but the bulb of quicksilver and the human body are affected differently. As to what feels hot or cold to one is a matter of conduction of heat. Silver, iron, wood and air at the same temperature feel differently. Silver will burn the skin at 156° F. It will blister the tongue at 150° F. Iron to do that would have to be considerably hotter. Wood can be handled when at a temperature of 200° F., and it is on record that men have stood an oven heat of 600° F. for a short time without apparent injury.

IN practice gas engines might be improved by increasing the inlet and outlet passages. The proper mixture of fuel may be tested by placing a pet cock in such a position that it opens directly into the compression space. When this pet cock is open the color of the flame which occurs at the time of explosion will indicate the proper mixture. A deep blue, similar to that produced at the base of a Bunsen burner, indicates that the mixture is about right, but if the edges of the flame are tinged with orange it indicates that the proportion of gas is too great.

CIRCULATION in a boiler is of value and should always be secured to a sufficient extent to keep the heating surfaces bathed in water and to prevent their undue heating and the injury of the boiler through unequal expansion. The more rapid the circulation the better will this end be attained, and some gain is also to be secured through the reduced tendency of sediment to deposit on the heating surface. It is in these directions, and not in any increased evaporative efficiency, that the gain from good circulation is to be found. While in theory rapid circulation should very slightly improve the economy of a boiler, the gain is too slight to be discernible by any practical tests.

IN battery renewal of a sal-ammoniac or a federal salt solution, not more than four or six ounces of salt should be dissolved in each cell filled two-thirds full of water, the old solution in every case being thrown away. Fresh bichromate solution is made by dissolving two parts of water and then adding five parts of sulphuric acid, all by weight. In renewing a copper sulphate solution, the jar with elements inserted, should be filled with clean soft water to within 2 inches of its edge; then small lumps of blue vitriol (copper sulphate) to the amount of eight ounces should be dropped in. If the battery is to be installed in service at once add to the solution four ounces of zinc sulphate which must be pulverized to dissolve immediately.

IF a boiler is tapped below the water line a jet of water will issue from the hole, the speed of which will be determined by the pressure behind it, and the form of orifice made; what this speed is for 100 pounds pressure is found by determining the height in feet of a column of water that will equal the pressure, extracting the square root of it and multiplying by 8. The temperature of water under this pressure in a steam boiler is 328° F., and it weighs 56.89 pounds per cubic foot. Dividing 144 by the weight per cubic foot, and multiplying the quotient by the pressure, shows that it requires a column of water 253 feet high to weigh 100 pounds to the square inch, the square root of which is 16 nearly. Then $16 \times 8 = 128$ feet per second.

IN a diamond drill any variety of diamond free from flaws and not too highly crystalline may be used; but flaws are frequent in all diamonds but the carbonados, and render the stones liable to break under the pressure to which they are subjected in the crown of the drill. A crown will last for about three resettings. By that time it has worn away too much to hold the carbons securely or to maintain the full diameter of the bore. The resettings should be made rather frequently, as it is poor economy to attempt to work a drill that has become worn and weakened. After the third setting the stones are taken out and set in a new crown. A metal bit will carry the boring in rocks of hardness even through an average distance of from 80 to 100 feet. The cost of wear on the iron bit is about 2 cents per foot for holes up to 2 inches in diameter.

THE distance to which signals can be reliably conveyed through pipes in mines is uncertain; straight pipe systems will carry the sound a long way; side branches are less reliable. Experiments have been made in coal mines, using sprinkler pipes put up to lay the dust, mostly galvanized wrought iron pipes, one or two inches in diameter, suspended by wires or hooks, or placed in conduits, and connected by flanges, with rubber packing, or fitted into one another with hemp packing, the branches generally joining under right angles. Using first a funnel-shaped mouthpiece, it was found that the hands were a better help; slowly spoken words thus could be understood at the extremities of straight pipes 1600 feet long, especially when the pipes were firmly fixed. Whistle signals were much less distinct; tapping

the pipes answered best, of course. Every side branch decreased the efficiency. Communication was fairly good, for instance, with a pipe 160 feet long, divided into two side branches, the main pipe being farther continued through a connection containing a valve to two other side branches, each of the four branches having a length of 700 feet.

IN the laboratory of the Mountain Copper Co. at Keswick, Cal., the following method is in use for the wet assaying of chalcocopyrite: Dissolve 1 A. T. of the ore in 6-inch casserole with nitric acid, diluted, so that the action will not be too vigorous, and using as little excess as possible. When solution is accomplished add 100 c. c. concentrated H_2SO_4 , and heat until the fumes of sulphuric acid come off freely; cool, dilute to about 800 c. c., heat to boiling until basic salts are dissolved, add a sufficient quantity of a concentrated solution of sodium thiosulphate to reduce ferric salts and a few c. c., excess to precipitate a small amount of copper; boil a few minutes to collect the cuprous sulphide and allow to settle. When the supernatant solution is clear decant through a filter, wash the precipitate on the filter dry and scorify. Care should be taken not to precipitate much copper.

RICH, high-grade ores take care of themselves, and a good market is afforded by the great smelting plants. Greater general interest lies in low-grade ores that occur in large bodies. Two, three or four dollar ores would be valueless in a small vein, but when it occurs in a deposit more than 400 feet wide one can build upon it for years. The Homestake mine upon ore averaging less than \$4 has not missed a monthly dividend in twenty-four years. It is a mistake to suppose that low-grade ore is only valuable when free milling; the lowest grade ore worked at a profit in the United States is not free milling at all, but produces an ore that must be stamped, concentrated and then smelted. Ore from the Atlantic copper mine has always yielded a value of less than \$2 per ton, yet it is mined, transported a distance, stamped, concentrated and smelted for about \$1.10 per ton, and has been worked at a profit, even when copper was lowest in price.

THE oldest and simplest form of electrical transmission is where a direct current dynamo supplies current to a line of wire from which it is taken without change of any kind for light or power. For illuminating limited areas or for furnishing power to motors through short distances from the dynamo such simple system is often the best. But it has limitations and does not admit of service beyond narrow bounds. Transmission of electric current over considerable distance without loss of power by direct current method necessitates the use of a current of very high electro-motive force, or the use of a transmitting wire of very large cross-section. In the two are developed structural difficulties and in the other arises the prohibitive cost of large copper conductors. The only alternative to those difficulties, ordinarily, is to generate a current of moderate electro-motive force, then to transform it by cheap but efficient apparatus to a high voltage current, then to transmit this current over a line which by reason of the increased electro-motive force and the correspondingly diminished quantity of current transmitted, may be of very small sectional area, then to reduce the electro-motive force at the receiving end by means of transformers to low voltages safe for application to electric motor windings, and finally, to use this twice converted current in motors of a design adapted to the special needs of the work to be done. In ordinary practice the alternating current is, alone, adapted to this method of operating.

IN the Dorcas pneumatic cyanide mill at Florence, Colo., capacity 120 tons per day, the ore averaging \$20 in value, passes through crushers and coarse rolls to the sampling room, thence through a revolving dryer and through two sets of finishing rolls, which crushes it to 24-mesh size. The finely crushed ore is then roasted in a Holthoff-Wetley furnace, the roasted product passing to the leaching tank. There are six of these tanks, 30 feet in diameter, 4.5 feet deep and fitted with air pipes in the bottom for the introduction of air during the leaching. The air is supplied at a pressure not exceeding five pounds, about 1 cubic foot of air per minute to each ton of ore being sufficient for agitation and oxygenation. The treatment generally lasts five days, and leaves a value of about \$1 per ton in the ore. The residue is then sluiced out and concentrated on Wilfley tables. The tailings after this treatment average about 40 cents per ton. The tanks are filled by a conveyor, and as soon as the bottom of the tank is covered with pulp a solution containing ten pounds KCN per ton is run in gradually, the pulp at the same time continuing to flow until the tank is full. The air is then turned on gradually, and is kept on until the pulp shows an extraction of at least 90%. Whenever the air comes up unevenly through the charge the ore has to be stirred by men with iron rods. This generally requires about thirty hours. The air is then shut off and the pulp allowed to settle for one hour. Percolation is then begun, and the strong solution run off as rapidly as possible, followed by a weaker one of five pounds KCN per ton. This operation is continued until the tests of the solution show only traces of gold. Water is then added to displace the KCN solution. The loss in cyanide is stated to be less than one pound per ton. The dust resulting from the dry crushing is collected and treated with cyanide, without previous roasting. From dust assaying \$51.20 per ton the tailings only contained 80 cents per ton. It is added to the roasted ore in the leaching tanks, three tons to each tank, spread evenly on top of the charge.

The Treadwell Mine, Alaska.

[SPECIAL CORRESPONDENCE]

I read in the MINING AND SCIENTIFIC PRESS, Aug. 9, your remarks in answer to a subscriber in Colorado on the cost per ton of ore in the Treadwell mine, in which you state that the monthly returns of cost per ton were about the same, but that the tonnage milled showed a great increase under the new management. I herewith present to your readers two tables hearing on the consumption of dynamite for the month of June, 1900, under the old management, and the month of June, 1902, to which you refer in your columns, under the new management. In 1898 I asked the late Robert Duncan, who was first foreman and then superintendent of the Treadwell mine for a period of about seven years altogether, how much powder he calculated per ton of ore, including development work; he replied, one pound to the ton.

On this estimate I base my remarks on the following tables and have tabulated them very fully, as I think their study will well repay mine owners, managers and superintendents, as they illustrate two ways of obtaining the great object aimed at by all mine managers, viz.: a minimum of cost. The one table shows that the minimum of cost was obtained by keeping that end solely in view, and with no thought of a reserve for the to-morrow, while with the other, which strived for a maximum of production and a minimum of cost, a result was secured that seems impossible at first glance. And even if the following tables show nothing else, they must convince mine owners and mine managers that aggregation is the keynote to the obtaining of the minimum of cost, as in the one table we have a consumption of twenty-two tons, in the other sixty-six tons of dynamite, a difference of 200%, while the difference in cost per ton milled is less than 9%. The difference in milling plant was 240 stamps, or 80%.

In the following tables the term pits applies to the quarry portion of the mine. All the ore broken in the pits is hoisted from the 110 and 220-foot levels. Of the blasts recorded in the pits only 8% are holes; the other blasts are called bulldozing. The powder is placed on the debris from the blasting of the holes and broken fine enough to handle in the cars, and the mills can crush more ore per stamp that is broken up this way than if broken by drilling and blasting again, or by hand hammers, though heavy machine drills are used in the stopes to drill the larger lumps of ore broken by the heavier drills. The fuse is in two lengths, 5 and 7 feet. Twenty per cent of the primers used in the mine are 7 feet, in the pits 8% are 7 feet, the shaft primers are 10 feet. It takes about a case of fuse, 6600 feet, to a thousand primers.

I have prepared the two following tables very fully, as they will well repay a close study, as one of them, I believe, records in detail the largest amount of explosive supplies ever used in a mine in one month:

EXPLOSIVE ACCOUNT TREADWELL MINE, JUNE, 1900.				
Where Used.	Pounds Powder.	Per cent of Powder Used on Different Levels.	Number of Blasts.	Pounds Powder to Blast.
Pits.....	30,950	69.239	11,626	2.66
110 level.....	250	.559	110	2.02
220 level.....	7,600	17.002	2,235	3.44
330 level.....	2,900	6.487	825	3.51
440 level.....	250	.559	90	2.07
Contractors..	2,750	6.152	780	3.52
	44,700		15,665	

15,665 blasts to 44,700 pounds powder, an average of 2.84 pounds to the blast; 86.79% of powder used above the 330 level. As 41,904 tons were milled this month we have an excess of powder to tons of ore milled 2796 pounds. The monthly report for this month shows a cost of 67½ cents per ton of ore milled.

In June, 1900, the 240-stamp mill was being dismantled and rebuilt, and consequently only 300 of the 540 stamps were running, and the table above shows where each management used his powder, and below will be seen the difference of per cent in explosives used, weight of battery, tons milled, cost and presumed reserves created. The 300-stamp mill crushed during June, 1902, 52,654 tons against June, 1900. The difference in cost of labor in mill hauling and rock crushing was \$30.20.

JUNE, 1900.				
Explosives used, 22 tons.....	66 tons.....	200		
Number of stamps, 300.....	540 stamps.....	80		
Weight of battery, 315,000 lbs.....	519,000 lbs.....	65		
Tons milled, 41,904.....	89,654 tons.....	113		
Cost per ton, 67.49 cents.....	72.89 cents.....	less than 9		
Reserves created, 1 lb 1 ton theory, 2796 tons.....	42,746 tons.....	1528		
EXPLOSIVE ACCOUNT TREADWELL MINE, JUNE, 1902.				
Where Used.	Pounds Powder.	Per Cent.	Number of Blasts.	Pounds Powder to Blast.
Pits.....	65,700	49.622	31,975	2.05
110 level.....	400	.302	195	2.05
220 level.....	10,300	7.770	3,770	2.67
330 level.....	11,300	8.610	4,325	2.61
440 level.....	36,400	27.492	10,795	3.37
600 level.....	3,600	2.711	915	3.93
Shaft.....	1,650	1.103	513	3.20
Contractors..	3,050	2.813	815	3.74
	132,400		53,303	

53,303 blasts to 132,400 pounds powder, averaging 2.48

pounds to the blast; 57.69% of powder used above the 330 level. As 89,654 tons were crushed this month we have an excess of powder to tons crushed of 42,746 pounds.* The monthly report for this month shows a cost of 73 cents per ton milled.

It is the intention of Joseph MacDonald, the general superintendent of the Treadwell group of mines, to create a reserve of 1,000,000 tons of ore, and the reason I have been so particular to call the reader's attention to the percentage extracted from the pits and upper levels is the fact that all the machines in the pits are set on the tripod, and the holes are 11 feet and sometimes 16 feet deep, and half of the machines on the 110-foot and 220-foot levels are also on the tripod. No machine below the 220 level is on a tripod, and the efficiency of the machine on the first is as 60 to 40. The holes in the stopes of the levels average by the tripod 9 and bar 7 feet. Another reason, the tripod is always set on solid rock, so that necessarily there need be no reserves; but the har machine in the stopes is set up on broken rock, so that when you start a stope below the 220 level you only draw a third of the ore broken until your stope is carried to the level above. So that the new management is only accepting the inevitable in straining every nerve to create a large reserve, and if the late Mr. Duncan's estimate holds good with the har drill as with the tripod, the new management is to be congratulated on its success by creating in one month over 40,000 tons of a reserve; if no reserve is formed in June, it is a bad omen for the rest of the year, as this month is usually one of the best for procuring plenty of power from melting snow, even if the rainfall is light.

A new 20-drill air compressor is to be installed, so as to keep the air pressure at eighty-five pounds. The medium-sized drill has been gradually replaced by one of the newest and heaviest type.

Since January, 1901, the new shaft has been sunk 335 feet and is now in 844 feet and still sinking.

The tramping of the 2915 tons hoisted daily is done by horse power on the three upper levels, a horse pulling a train of six cars; on the 440 level an endless wire rope system, operated by steam, hauls a train of twenty-two-ton cars; formerly all the tramping was done by car men.

The reason the milling tonnage was so low for June, 1900, is that the 240-stamp mill was being torn down and rebuilt.

The London Financial News of March 13, 1902, states that the Treadwell Co. spent \$500,000 on the building of the 300-stamp mill, the rebuilding of the 240-stamp mill and the erection and equipment of the new hoist—all out of the profits of the mine, besides paying its annual dividend of 6% on its \$5,000,000 capital, and 7½% of its capital has been paid in dividends to its stockholders.

The same authority gives the cost in 1891—the year after the present company was formed—at \$1.68 per ton, and in a local paper, of date 6th inst., a noted mining expert from Rossland, B. C., who had just been on a visit to Douglas Island, gives the cost at the Treadwell for the last year ending May 15 at \$1.28 per ton.

Douglas Island, Sept. 10, 1902.

The detail and analysis of our correspondent's statements are of manifest interest. Any such reliable data concerning that property is always sought by mining men. In this regard it is deemed of added interest for purposes of extended comparison to append the last report to hand, which is the eleventh annual statement of the company for the year ending May 15, 1901, showing the following exploration and development work completed during the year:

No. of Level.	Drives. Feet.	Crosscuts. Feet.	Raises. Feet.	Total. Feet.
220	463	10	406	879
330	1,247	212	482	1,951
440	1,395	52	501	1,948
Totals...	3,105	274	1,389	4,778

No shaft sinking was done during the year. No. 2 shaft will be sunk to the next level during this year.

Exclusive of pits, the total development of the mine to date has been as follows: Drives, 10,907 feet; crosscuts, 3534 feet; raises, 4017½ feet; shafts, 778 feet; total, 19,236½ feet.

The amount of ore mined and sent to the mill from the several levels during that year was as follows: Adit and 110-foot levels, 218,490 tons; 220-foot level, 176,902 tons; 330-foot level, 44,059 tons; 440 foot level, 18,351 tons; total, 457,802 tons. The ore was mined and placed in the mill bins at a total cost of \$321,996. At the date of previous report (May 15, 1900), there were estimated to be 125,000 tons of broken ore in the mine. The succeeding year the amount of ore in the mine was 339,290 tons, an addition of 214,290 tons. The cost of tramping, hoisting and hauling to mill was about 20 cents per ton, which on 457,802 tons amounts to \$91,560. Deducting this from the total cost leaves \$230,435 as the cost of breaking 672,092 tons of ore, or 34.29 cents per ton. Adding the 20 cents cost for delivery to mill, the total cost per ton, including development, has been 54.29 cents. The es-

*It will be observed that the average charge to the blast in the pits is 2.66 and 2.05 pounds respectively. This gain of over six-tenths of a pound is effected by using a primer ¾x4 inches and 1¼x4 inches instead of one 1¼x8 inches.

timated amount of ore in sight and available for the mill on May 15, 1901, was 3,917,589 short tons.

The hullion recovery for the year was as follows, the averages being calculated on the total tonnage passed through the mill:

	Total.	Per Ton.
Tons crushed.....	457,802	.....
Tons sulphurets saved.....	8,143	.....
Tons sulphurets treated at Tacoma smelter.....	7,195	.....
Free gold from mill.....	\$559,126	\$1 22
Gold from sulphurets.....	301.611	66
Total.....	\$860,737	\$1 88

The value per ton of sulphurets was \$41.02. At the close of the year there were 845 tons of sulphurets on hand, saved during the year, valued at \$35,422, which would bring the total yield up to \$896,159, or \$1.96 per ton.

The statement of earnings and expenses for the year is as follows:

	Total.	Per Ton.
Bullion sold, as above.....	\$860,737	\$1 8801
Merchandise account.....	32,325	0706
Iron and foundry profits.....	5,465	0120
Total profits.....	\$898,527	\$1 9627
Mining.....	\$321,995	\$0 7034
Milling and concentrating.....	85,101	1 0859
Sulphuret treatment (\$7.79 per ton).....	56,036	1224
General expenses, Douglas Island.....	4,610	0101
San Francisco office.....	6,173	0135
London office.....	1,326	0029
Paris office.....	224	0005
Consulting engineer.....	1,057	0023
Legal expense, San Francisco.....	812	0017
Bullion charges.....	5,985	0140
Total working expenses.....	\$483,319	.....
Construction.....	62,649	.....
Total expenses.....	\$545,968	.....
Net profit for the year.....	\$352,559	\$0 7701

The total ore taken from the mine and treated from its first working up to the close of the last fiscal year was reported 3,082,133 tons. The total yield was \$7,479,272 in free gold from plates and \$3,101,355 from sulphurets saved—an aggregate of \$10,580,627, or \$2.78 per ton; the total expenses were \$4,979,961, or \$1.31 per ton, showing total net profits of \$5,600,666, or \$1.47 per ton.

The Mt. Morgan Mine.*

Marvelous tales are told of the Mt. Morgan mine, Queensland, Australia, it being described as the "greatest gold mine in the world;" "a geological puzzle;" "the despair of scientists," etc. There is nothing very wonderful about it, but it possesses some features that make it of interest, and two photographs have been secured, one of the Mt. Morgan Works, an engraving of which appears on page 171, the other showing the top of the mountain from the west side, and illustrating the system of timbering by square sets, which has been engraved for that page. It also shows in the open the system previously adopted of working the lodes or hunches of ore in the interior of the mountain. As the ore was removed from the floor where the start was made sets of squared hardwood, 1 foot diameter and 6 feet 6 inches in height, were put in, and this was followed to the end of the richer ore. As the miners rose to get the ore above the squared sets were built up, one on the other. From the outside the mountain is being steadily removed by means of open cuts, and in the picture is shown where the workmen have broken into that part where the squared set stopes were. The removal of the hill has also revealed some of the tunnels which were made in exploration work.

The Mt. Morgan ores are such as are found in conjunction with huge pyritic deposits all over the world, and the only thing unusual about them is the quantity of gold they contain. A portion of the high pyrites bodies is in such a state of crystallization that it disintegrates and decomposes with remarkable ease and speed. The mine is merely the result of the climatic conditions prevailing in that Queensland locality, and is simply evidence of the long continuance of similar climatic conditions to those existing at present. These conditions were assisted in their decomposing effects upon the huge pyritic deposit by the fact that at one time the deposit had been intersected by dykes of dolerite, an igneous material which rapidly decomposes under atmospheric influences. Dolerite and pyrites decompose rapidly when separate, but standing side by side they help each other, the acid products of the pyrites acting powerfully upon the basic dolerites.

The deposit filled a crater-like basin originally rising 500 feet above the surrounding tableland. The ore is a brown hematite containing silica, passing gradually into a ferruginous siliceous sinter. Both the ironstone and sinter contain gold finely disseminated through the rock.

Along the junction of the oxidized and sulphide ore the decomposition of the latter can be seen in all stages, passing from a cellular, slightly brown quartz

* See illustrations, page 171.

to hard, pyritous rock quite unaltered. In the intermediate portions the pyrites are seen lying loosely in cavities in the quartz. Of two specimens, taken at a distance of 15 inches apart vertically, one is a cellular lump of quartz and silicified country rock, containing no pyrites, but having the cellular spaces partially filled with a soft, brownish material, which looks like a magnesian mineral. The other is white quartz, speckled with pyrite crystals, many of which are loose. In this lump are portions free from pyrites, which look like an altered feldspathic rock. Both lumps have the smell peculiar to the action of sulphuric acid on clays and feldspars. Within a space of a few square yards a great variety of decomposition products can be seen, and all the openings in ore give evidence of rapid oxidation in the efflorescence of sulphates of lime, magnesia, iron and copper existing everywhere. Veins of satin spar, which have been formed in this way, occur, filling cracks and fissures, and are still forming, and in a few places possess an emerald tint, due to the presence of copper. The irregular association of kaolinic material with siliceous and iron ores, which seemed so extraordinary in the upper levels of the mine, is now easily explained.

The dykes that have intersected the Mt. Morgan lode have penetrated in an erratic manner, and in the lower levels of the mine masses of country rock and ore can be seen entangled in arms of dolerite of all shapes and sizes. In places it is hard to tell at first glance which is ore, dolerite or country rock. No simple fissures took place here, but a tremendous crushing in several directions, forming numerous irregular openings, into which rushed the probably very fluid basic lava, now forming the dykes. The weathering of such a mixed mass would produce the curious blending of the Mt. Morgan gossans and so-called sinters, and lead to local peculiarities of form, in which the fanciful could easily see funnels and basins, bombs and boulders. One of the features of the new Mt. Morgan is a perfect series of mine plans kept plotted up to date, showing the network of dykes which intersect the ore body. These plans will possess, as the mine development progresses, scientific value to the student of ore deposits. The size of the great ore body is well maintained.

Regarding the reported existence of tellurides in the mine, while no large quantities of tellurides have been detected, almost all of the ore will give reactions for tellurium. The appearance of the mine has changed and the metallurgical department shows still greater changes. The method of treatment is still that of chlorination, but, though the same in principle and involving the same chemical reactions, yet the mode of application has so altered as to make the present system almost a new process. By the former system the ore was crushed dry in rolls, calcined in small hand reverberatories at a heat too low to dehydrate the kaolin; then chlorinated in barrels, the gas being generated under slight pressure, the gold chloride leached out by water and the gold precipitated on charcoal. Although the plant was in the aggregate the largest chlorination mill in the world, yet the separate units—furnaces, barrels and filters—were all small, involving an immense amount of labor and supervision, to say nothing of the loss by leakage, waste and imperfect extraction at each of the many parts of the whole. The chlorine is now applied to the roasted ore as a solution in water, the method being similar to ordinary cyanide and hypsulphite lixiviation, in that the solvent flows onto the ore contained in large open vats, and, in filtering through, dissolves out the gold. This improvement renders possible chlorination on a gigantic scale. The economies are in chemicals, cheaper chlorine and less waste of gas in dealing with large charges; in power, the expensive revolving of the barrels is done away with; in skilled supervision, only the same care and attention is required by a very large vat as was required formerly by each separate small vat; in labor, the calcined ore passes direct to the vats, where it remains until it is discharged as tailings.

In the calcining department the improvements have been in the same direction of increased size of plant. For the oxidized ores large revolving calciners, discharging continuously, are now employed, while for the pyritic ore the general manager has invented a roaster. Metallurgists know that in nothing do ores vary more than in their capacity for resisting oxidation. A roaster which suits admirably a certain ore or the requirements of a certain process may be, and often is, very inefficient when applied to other ores and other processes. The Mt. Morgan ore, though carrying on an average only 15% of pyritic minerals, is difficult to roast dead, and, as in other chlorination methods, a very perfect roast is required for good extraction and economy of chlorine. The ore is dry-crushed in ball mills, then roasted in four large shaft furnaces, cooled and passed automatically to the bins. From these it is trucked to the vats, where it is leached. The vats are large, oblong tanks of concrete and cement, 4 feet deep, with a filter bed of sand and gravel at the bottom. The chlorine is generated from manganese dioxide, sulphuric acid and salt, in stills in the ordinary way, then absorbed by water contained in large cement-lined and covered tanks. From these tanks the chlorine water is conveyed in earthenware pipes and applied direct to the calcined ore in the open vats. The gold-bearing solution is then passed

through charcoal filters. Every part is designed for large tonnage. The tailings are removed from the vat by a mechanical shovel.

The percentage of gold extracted is 95% of the assay value. The gold is the purest yet found anywhere, being approached in purity only by that of the Guiseppe mine, Tuolumne county, Cal. It contains 99.7% pure gold, the rest being copper, with traces of iron and silver.

The mine was opened in 1886. In 1897 the yield based upon the ore worked was \$30.29 per ton; the total working expenses were \$12.53 per ton.

Under date of August 6, 1902, a Mt. Morgan letter to this paper says: "The whole mine is supplied at present by water brought by train—200,000 gallons daily, brought up by rack train. It is three years since the Dee river has run. Not a drop of rain fell here during May, June or July."

Notes on Machinery Constituting a Mining Plant.*

The following notes may be found useful to mine investors and engineers in charge of mining properties; and, although written with a particular view to conditions in British Columbia, pertain to mining elsewhere as well:

From the very time that a mineral claim passes out of the prospector's ownership the question "how to work the property at the least expense and with the best results" presents itself to the investor, and that this has been an important as well as a difficult question nobody will doubt when referring to the numerous idle plants of more or less value found in nearly all mining camps. Any mining failures cannot but reflect on mining in general, and should therefore be guarded with all possible care by the professional engineers.

To make a paying investment and a mine out of a prospect without employing other power than hand labor is hardly possible nor excusable nowadays, except perhaps where the formation is unusually soft and the ores of very high grade, or possibly where the property is remote from any convenient point of transportation. In certain sections of the Slocan and Lardeau districts conditions of this nature exist, but, being rather exceptional, do not exactly come in under the class of mines referred to here.

Hand labor should therefore only be employed to prove the property to a reasonable depth, perhaps 100 feet or so, or sufficient to warrant the investment in a medium-sized hoisting plant; but here I have frequently observed that, instead of getting a medium-sized hoist—say a 10x12—that would develop the property for a couple of years, a large plant and sometimes even direct motion hoists with corresponding equipments are put in. Any one who is interested and makes inquiries why a smaller plant would not have answered the purpose receives invariably the same answer, viz., that expectations of having a great mine some day would make it impossible to get along with anything smaller. If the mine turns out to be wonderful, well and good; but the chances for becoming a great mine are nearly always against the prospect. The number of claims recorded every year compared with the number of paying mines shows this only too well. But even supposing that the small hoisting plant within a couple of years should have to be replaced with a larger one, there is hardly a stockholder to be found in any country that would not be pleased to learn that the mine was producing ore so rapidly that the original prospecting plant was now unable to cope with the increased output. The above does not pertain to hoisting plants alone, but to all matters pertaining to mining and milling investments as well, and it is hardly necessary to add that, if this first principle of economy in mining ventures had been followed out more generally during the past history of mining in British Columbia, considerable of the investors' money and disappointment would have been saved.

Hoists.—In regard to hoisting machinery, I find that it is quite common to see ordinary cast-iron gears and pinions used. As a matter of fact, a geared hoist should not be permitted to handle men anywhere without having the most perfect kind of gearing. I would recommend the use of a cast steel gear with well cut teeth running together with a rawhide pinion. I have applied this design successfully even on large double-cylinder hoists, where the hoisting speed at times would exceed 1000 feet per minute, and where a speed of 600 feet per minute with the ordinary cast-iron gears would be considered unsafe and excessive. The rawhide pinion also does away with 50% of the objectionable noise peculiar to geared hoists and reduces friction as well as wear of teeth.

Where two drums have to be used the main shaft should be in one piece and supported by three pillow blocks. One substantial gear with rawhide pinion placed as close to the center journal as possible will be found to give better satisfaction than two smaller gears on either side. Drums should be loose on the shaft and be provided with removable composition metal bushings. Each drum should be operated by an independent friction clutch, keyed to the shaft

close to the main gear, so that the drums can be run in balance or independent of each other as required. The engine should be fitted with reversible link motions of forged steel.

For a brake device I prefer the post brake, to which a very neat safety contrivance for overspeed can be attached. It consists of a small speed governor geared from the main shaft. Whenever the speed exceeds a safety limit of say 1000 feet per minute the automatic governor will cause a throttle valve to open, thus permitting steam, or, preferably, compressed air, into two small air cylinders, having their piston rods directly connected with the post brakes in such a manner that the compressed air forces the piston down, setting the brakes at the same time. One mutual governor will do for both sides, but each post brake must have its own independent air cylinder.

To take care of the surplus hoisting rope, and to save the dead coils from being worn by that portion of the rope which is in constant use, a false reel can be placed inside of each drum and so arranged that the extra rope can be conveniently let out through a slotted hole in the rim of the drums whenever required. This avoids rope slicing. Unless the mine is producing 500 tons per twenty-four hours from a depth of 1500 feet or more, I prefer a self-contained double cylinder 14x18 geared hoist of the above description even to a first-motion hoist. The amount of material that a hoist of this character is able to handle is quite astonishing, especially where two skips, each of two tons capacity, are used.

SKIPS VERSUS CAGES.—For vertical shafts where the vein is perpendicular, or nearly so, it is only fair to admit that the well-known mining cage has done good work; but wherever it is possible to use a skip or skip car I always prefer it to the cage. Within the last few years the skip system has gained much favor and has been introduced pretty well throughout all the large mines in Butte, Mont., as well as South Africa, both for vertical and incline shafts. It stands to reason that where a large amount of material has to be handled from several levels and from a considerable depth, a single-deck cage with room for one one-ton car only is quite insufficient, and two, three or even four deck cages will have to be employed to do the work. In such cases the combined dead weight of cages and cars becomes both enormous and impracticable. I remember two well-known mines in Butte where four-deck cages were used until a five-ton vertical skip was introduced. Each deck was carrying a one-ton ore car, and the combined weight of four cages and four empty ore cars aggregated 9600 pounds, or 2400 pounds of steel per ton of material hoisted, while a five-ton vertical skip that was put in later on only weighed 5000 pounds, being equal to 1000 pounds of steel to one ton of material hoisted. Where good fuel is expensive and several thousand tons of material are hoisted every day, as in the above case, the amount saved in coal represents a very handsome yearly dividend. The same rule also applies to a smaller hoisting plant. The average weight of a standard mining cage is about 1200 pounds and a 16 cubic foot standard ore car weighs about 800 pounds, making a total of 2000 pounds, while a one-ton skip or a skip car with safety clutches will not exceed 1500 pounds. If 200 trips are made during the twenty-four hours, the extra dead weight would amount to fifty tons, or 25% of the hoisting capacity.

To make the skip system a success it is necessary to have bins or ore pockets cut out at each station in the mine so as to receive the ore or waste made during one shift. When the car man has emptied his car into the ore pocket he returns to the chute to refill it. Any time during the shifts the pockets are emptied, and it will then require a man at the bin gate to fill the skip and prevent spilling of material down into the shaft. This last feature was solved in vertical shaft propositions when the pneumatic ore bin gate was introduced in Butte, as it enables the operator to shut off the ore stream within a second, or, in other words, when the skip is loaded. In addition to the pockets at each level, a storage bin will be required at the top landing. Depending upon the arrangement, several combinations for handling both ore and waste on top can be made, depending upon the ingenuity of the engineer in charge.

It will readily be seen from the above that, by the skip system, economy in labor is possible and the proverbial "waiting for the cage" is done away with. The skip is equally as convenient for handling men and material down to the mine and is safer than a cage.

It is generally advisable to have a large bin capacity on top, as it is often necessary to store different classes of ore. Ideal conditions are those where the ore can be loaded directly into railway cars. A crusher and screen placed above the bin will always be found convenient for breaking and sizing the ores. Ore bins and gallow-frames can usually be built together, and I think that in British Columbia wooden gallow-frames are preferable to expensive steel ones. The danger from fire is equal in both cases, as wood cannot be avoided for the construction of floors and the cost is at least twice as much again as the best wooden frame.

Head sheaves should always be large and lined with rubber or hemp to save the hoisting rope. Wrought-iron spokes cast in with the hub and rim should be

*Read before the Canadian Mining Institute meeting in Nelson, B. C., Sept. 12, 1902, by Alfred C. Garde, M. E., General Manager Payne Mines, Sandon, B. C.

avoided, as the spokes soon will get loose and commence rattling. Substantial shafts made of hammered steel and self-oiling journals are recommended.

For hoisting rope a flexible plow steel, six strands, 19 wire rope is the best. For a skip of one ton capacity a $\frac{3}{4}$ -inch rope is sufficient and for a two-ton skip $\frac{1}{2}$ -inch. It is very common to find too heavy rope used, which, unless the sheaves are proportionally large, will ruin the rope within a short time. The most convenient incline in a shaft using skips is 70°. Rollers should be provided at intervals in the shaftway, thus preventing the rope from dragging on the foot wall.

For inside work over winzes and for sinking purposes I like the friction hoist. It is not exactly the type of hoist that should be placed over an important outside working shaft, but will be found extremely convenient for prospecting with a bucket or small skip. Care should be taken that the hoist is not overloaded, in which case the friction might slip.

Where compressed air is used for hoisting purposes it will nearly always pay to reheat the air just before entering the cylinders. The reheater should be placed as close to the hoist or air drills as possible and all pipes wrapped with waterproof asbestos covering. It is not always convenient to use coal underground. In some cases coke, if not too expensive, might be used.

British Columbia is extremely fortunate in possessing large areas of desirable steaming coal—an advantage which is only surpassed by the abundant water power distributed over the greater portion of the province. No other section in North America can probably equal it in that respect.

Where coal is used for generating purposes I find that eighty or ninety pounds steam pressure is frequently the limit. I should, however, advise having the boilers built to carry 125 or even 150 pounds pressure, as it will be found a saving of fuel to do so.

(To BE CONTINUED.)

Of Historic Interest.

In the issue of the 9th ult. appeared an article on the evolution of the California stamp mill, written by M. P. Boss, in which reference was made to Irving M. Scott of San Francisco and his prominent part in producing the tappet, gih and cam, substantially as they exist to-day. In the course of the article, which is of interest to miners everywhere, Mr. Boss said:

"The high box mortar is thought by some to be due to Zenas Wheeler; but positive information on this point is unattainable. Nor is it to be ascertained to whom is due the introduction of the long battery foundation blocks, set on end."

These matters are of historic interest, and to secure authentic data the MINING AND SCIENTIFIC PRESS wrote to Irving M. Scott, then vice-president and general manager of the Union Iron Works, suggesting that some data on the subject would be of interest and value.

Under date of Sept. 6th, Mr. Scott kindly furnishes the following:

"Your favor of Aug. 8th duly received, and I delayed answering it until I had time to give you the information desired.

"The high mortar now in use is the result of a careful collection of the facts pertaining to gold crushing on the great mother lode. The writer visited all points of interest and carefully examined, measured and sketched the various mortars in use, and the kind of ore and gold mined. The mortars were simply low iron troughs, from 5 inches to 7 inches deep, in which dies were set. The balance of the mortar was made by the millwright at the mill, and consisted of wood lined with sheet iron, of such height as suited the ore worked.

"In some cases the writer found that the discharge of these mortars was very low. Upon inquiry he was told by the millmen that they crushed more rock and saved more gold out of the ore worked by having the discharge that height than by any other that they had tried. The parties in control did not attempt to give the reasons, but simply stated the fact. Again I found the discharge of the mortar very high, and the reason given was that they got more gold out of the ore, though they did not crush quite so much rock. Other mortars would have their discharge at various heights between coarse and fine gold, in which case they claimed that they crushed more rock and obtained more gold than at any other position.

"By carefully measuring these details of mortars and the kind of ore worked, and laying them down on the drawing board in the office of the Union Iron Works, and comparing the different methods, it was found that the low discharge was always used for coarse gold, the high discharge where they had extremely fine gold, and the medium discharge where the gold varied—some flakes and some grains. Therefore, it became apparent to the writer that the law which governed the kind of mortar to be used was regulated by the ore worked, and the millwright had discovered the true height and shape by experimenting, without knowing the real reason.

"About this time Almarin B. Paul introduced what was known as his rotary battery. The nature of the mechanical construction of this battery made a high mortar necessary. From the data obtained

by these very complete and exhaustive tests the writer designed mortars for gold working, for wet crushing and also for amalgamating in the mortar. It was found that the mortar in which you amalgamated had to be wider than where you simply crushed, or else the dropping of the stamp would cut the amalgam off of the copper plates on the lip and in the back of the mortars, and owing to this width not quite so many tons could be crushed in a given time, as in simply wet crushing the mortar is made as narrow at the base as the feeding of the ore will permit.

"In the meantime the Gould & Curry mine had crushed some of its silver ore dry, using the low mortar and building up with the wood and sheet iron. They developed in silver crushing the same condition governing the kind of mortar as in gold crushing, except there was no need in the wet method of very high discharge. Gould & Curry tried to crush through grates in the bottom of the mortar for dry crushing. This led to a series of experiments as to the size of the dry crushing silver mortar, wet crushing, etc., and a mortar to amalgamate when gold was carried in the silver. This, I believe, is the correct account of the evolution of the high mortar as now used in California. It may have been used elsewhere before this time, but I do not know of a single case where the present standard mortar was used in California prior to that time. All the mortars were the outgrowth of the experience of millmen, millwrights and mechanics working at the mill, and, like all valuable inventions, each point was slowly worked out to demonstrate its value.

"Referring to the double-arm cam with a hub on one side, Dr. Southgate, was the inventor of the single-arm cam with a hub on one side, and he claimed that he could get more drops per minute with a stamp, with less jar or blow, by the single-arm cam, hub on one side and stem close to the shaft, than by any other device. In making Dr. Southgate's cam and running it twice the speed of the double-arm cam, a serious wear upon the cam surface and tappet was developed, and the difficulty of keeping this shaped cam tight on the shaft, for in those days the workmanship was not of the best, led the writer to study the question carefully, and when Mr. Smith of Washoe, the owner of the Smith process for amalgamating, was having a mill built for Mr. Fogus, he used the cam of Dr. Southgate and developed the same difficulties. It then occurred to the writer that there was no reason why the cam should not be built with double arms and the hub placed on one side, getting the stem just as close to the side as possible, and giving a blow very much less on the tappet. This idea was carefully worked out and the cam put in the Rappahoe mine, and from that time on all cams were made of that type.

"The first attempt to remedy the surface wear of tappet and cam was to chill the surface of the cam and chill the faces of the tappet. As neither could be satisfactorily adjusted after they were chilled, and as the grinding of them changed their angles somewhat, this method was finally superseded by steel faces and rings put on to the tappet, and a steel covering over the edge of the cam where lifting was done. Advocates of the steel face on the tappet claimed that then the tappet would never wear out, but only the face; eventually, however, both of these methods were discarded in favor of the double-arm cam with a hub on one side, which seemed to overcome all the difficulties, and if made of proper iron lasts a sufficient time for all practical purposes.

"One of the most interesting items in regard to machinery for metallurgical purposes is the evolution of the amalgamating pan. Thomas Varney developed a plan much after the shape of a pair of millstones, and operated on the same principle, having removable shoes on the bottom of the runner and dies on the bottom of the pan, but no provision being made for directing the pulp to the center, to be again thrown out by the centrifugal force in the passage, being ground between the upper and lower shoe. Zenas Wheeler got up a plan very similar, with the exception that he put wings or guide boards on the side of the pan, compelling the pulp to flow in at the center and discharge at the periphery. Neither Mr. Wheeler nor Mr. Varney patented this wing, and in the famous lawsuit between them it was demonstrated that it was the most valuable part of their devices and had not been patented, as Mr. Varney ridiculed the idea of patenting anything to make the pulp flow to the center, as he said that was where it would go naturally, and Mr. Wheeler, while differing from him, did not attempt to patent his wing or guide boards, considering other devices of more value. The result was that the best parts of these pans were taken, the wings or guide boards making a dominant feature, and the combination pan was the outcome of the lawsuit, which pan maintained itself in the market during the entire silver excitement, and is practically the pan now being built to-day. The inverted cone pan of Messrs. Hepburn & Peterson, and the tractory curve pan of Messrs. Wheeler & Randall, as well as a great many variations of pans, did not affect the classification. The man who did the most for the settler was Zenas Wheeler. He made several devices and continued to experiment, and his work finally resulted in the settler as it is at the present time, with a slightly conical bottom,

plenty of water and slow motion wooden shoes. These seemed to be the prominent points in metallurgical machinery at that time.

"Hoping this information may be of service to you, I remain, respectfully yours, IRVING M. SCOTT."

Present Cyanide Practice.

Robert O'Brien, foreman Day Dawn P. C. Co., Charters Towers, Australia, says: "The solutions I have used have been strong, from 0.35 to 0.45; weak, from 0.14 to 0.18. The lime I used was generally mixed with the tailings before dumping; sometimes it was mixed while the stuff was being screened. The quantity used varied from two to forty pounds a ton. The method is this: The tailings are brought to the works, mixed generally with lime, and allowed to stand a week or so. Then they are trucked and run to the brace and hauled up by steam power and put in a pulverizer, which mixes the lime; then they go into the hopper, and from there are put into trucks and run to the vats. These are 20 feet by 7 feet, with 18 inches false bottom, made of stone, fine and coarse, and gravel. The coarse is on bottom, fine on top, and gravel on this. Over this is batten work filled up with coarse gravel so as to make a level surface. The sand is dumped on the top of this. There are ten sand vats of sixty tons each, two are filled every day. When the material is in the vats a strong solution is run on. The solution varies from 0.35 to 0.5 (sometimes as high as 0.68). (If fresh ore is used we assay it to find out quantity of gold in it, and test with two solutions of different strengths, and subject it to two days treatment. Whichever solution extracts most gold, that we use). The strong solution remains in contact for twenty-four hours. Then it is tapped off into a sump. It is allowed to disappear from the surface. Then we run on a weak solution, which generally runs for three days, the tap remaining open. From the sump the solution is pumped up into the receiver, and then falls by gravitation into three extractor boxes which contain filiform zinc.

"Before the solution is run into the extractor box, test is made to find if solution is strong enough to precipitate gold. We assay every vat before and after treatment. After the weak solution a water wash is put in to wash out the cyanide. When the solution is being put through the boxes the zinc is taken out and placed on a sieve and washed with the hands to get off the gold pulp, and the zinc is put back in boxes and used again. The gold slime is placed in a filter with stone and sand, and what remains on top is put into a furnace and roasted. It is mixed with sand and horax and smelted in a plumbago crucible, and then poured into an iron mold. It is roasted to get oxide of zinc out of it. After moulding it is melted and run into a bar. Then it is assayed and sent to the bank. I use the lime always, to save cyanide. I treat concentrates apart from tailings."

W. A. Dixon says: "I naturally use a weak solution. If a strong solution he used, a large quantity of base metals would be dissolved at the same time as the gold, and therefore the ratio of base metal to gold in the solution would be greater than if in a weak solution. The base metals are in a much coarser state than the gold. The selective action, if any, really depends on the amount of surface metal exposed. If the copper were as finely divided as the gold, the cyanide would probably prefer copper. The chemical action with the base metal compounds does not require oxygen, as is required with the gold. Bisulphide of iron, arsenical pyrites, sulphide of zinc and galena are not acted on by cyanide of potassium. But the cyanide attacks various compounds of copper and zinc sulphides, oxides and carbonates of copper. The process is inapplicable to certain ores which contain quartz, earthy matter and little pyrites. With copper ores the cyanide dissolves so much copper as to make the process useless. The effect of acid on the KCN is that it sets free hydrocyanic acid and forms a sulphate of potassium. Lime must be used to prevent this acid action. The hydrocyanic acid will not practically dissolve gold. Mineral acids tend to preserve the solution of cyanogen gas. The pressure indicated by the specification of a closed vessel is to me ambiguous. The free oxygen would be present in water sufficient to take three ounces of gold in one-half ton of water, but not to take out say twenty ounces. Many cyanogen yielding substances will not transfer their cyanogen to the gold. Mercuric cyanide will not act as a solvent. I do not know of any substance which in solution in water will set free cyanogen gas as a gas in water. I have not found by experiment that cyanogen gas itself will dissolve gold. I took some dry mercuric cyanide, using a quantity which would yield cyanogen gas to saturate a liter of water. I washed the gas by passing through wash bottle containing distilled water, and then passed into distilled water contained in a blue bottle—the light tending to decompose cyanogen—and later tried effect of solution on gold. I have made experiments with cyanogen gas on Mt. Morgan ores, on Mundic ores, and on oxide ores—ground samples—allowing for a contact of twenty hours with gold leaf, but no gold was dissolved, even with all distilled water."

The Gold Production of North America, Its Geological Derivation and Probable Future.

Reference was editorially made in last week's issue to a paper with the above title, read by W. Lindgren of the U. S. Geological Survey, at the Butte, Mont., meeting of the Mining Congress on the 3rd inst. The matter is deemed of sufficient general interest to be presented in full:

It should first be stated that practically the whole of the gold output is derived from fissure veins or from deposits which possess close relationship to fissure veins. Gold-bearing fissure veins are in most cases accompanied by placers which are only the result of nature's crushing, concentrating and refining; and these placers may be of different ages, according to the date of formation of the vein. For the present purpose the placers will not be considered separately but as belonging to the veins from which they were derived. Fissure veins are formed chiefly by ascending hot waters. From this we conclude that the gold has been brought up from lower levels of the earth's crust.

Fissure veins carrying gold have been formed at various times during the geological history of the continent. The conditions seem most favorable when extensive eruptions of surface lavas and intrusive granites and porphyries have taken place. As a last chapter in the eruptive activity, the hot springs bring up their loads of precious metals and deposit them in the fissures in the earth's crust, which they follow as the easiest paths. The question as to the origin of the gold, or, in other words, from where the waters obtained their charge of precious metals, is a most interesting subject, but one which does not concern us at present.

From the Eastern coast to the Western ocean the mountains of North America contain gold, although the greatest treasures, as is well known, are stored in the great ranges of the Cordilleran region.

From the time of discovery up to 1900 the United States have produced \$2,360,000,000, Mexico at least \$181,000,000, and probably twice as much, and British North America \$142,000,000, making a grand total of \$2,683,000,000. This great product is divided among primary veins of pre-Cambrian, Cretaceous and post-Miocene age. These are the grand divisions, but when it comes to details it will soon be seen that it is a difficult matter to separate the last two groups. In fact, from the beginning of the Trias down to the present times great eruptions have followed each other on the Pacific coast, and each of these was probably accompanied by more or less extensive gold deposition. In the Rocky mountain region the igneous rocks began to break out at the close of the Cretaceous and have continued up to a recent date. On the whole, then, the gold belts of the Pacific slope antedate those of the Rocky mountain region, though in both provinces the mineralization has continued to the late dates. Even at the present time gold veins are known to be forming in certain parts of Montana and Nevada. But far older than these is the first-mentioned pre-Cambrian group of gold veins, and we will begin by consideration of these.

About 100 years ago gold was discovered in the slates of the Appalachian mountain region, in Georgia and in the Carolinas, in Tennessee, Maryland and Virginia—yes, even farther north. These are placers and gold-quartz veins with free gold and auriferous sulphides, and much of the gold can usually be extracted by amalgamation. Poorer deposits of the same kind have been found up to the Canadian line and north of this richer gold veins occur in Quebec, Ontario and Nova Scotia. During the last century this belt produced \$47,000,000 in the United States and \$17,000,000 in Canada, chiefly in Nova Scotia, and during the last ten years the Southern States have pretty regularly yielded \$300,000, and from \$500,000 to \$1,000,000 in Canada. They are not rich, according to our standards for the Cordilleran provinces, but the yield is steady and can be relied upon for many years to come.

Most of these veins were evidently formed before the Cambrian period; they are thus very ancient and existed long before the great forests of the Carboniferous had been transformed into coal beds. We have evidence of this, for the Triassic sandstones of the Atlantic coast contain placer gold; Carboniferous conglomerates in Nova Scotia are likewise said to contain debris of these veins, and in the Black Hills the Cambrian sandstones yield placers of precious metal.

This locality has not been mentioned yet, but it is

the most important of the deposits of the pre-Cambrian age. The old pre-Cambrian schists of the Black Hills in South Dakota contain fissure veins and seam belts of free-milling gold ores at places where erosion has removed the overlying Cambrian sandstones. These deposits are worked on a large scale, though the ores are poor and have yielded since the discovery in 1877 about \$80,000,000, and produce annually from \$3,000,000 to \$4,000,000 from this source. Here again the yield is said to be assured for many years, and this sustains the statements made above about pre-Cambrian deposits.

Altogether, then, the pre-Cambrian deposits have given us since discovery \$144,000,000. One more thing should be said about this class: In most cases extensive erosion has taken place since these veins were formed, and the surface of the land at the time of their formation must in some cases, at least, have been thousands of feet above the level at which they are worked at present. They are the "roots" rather than the outcrops of veins, and this inspires belief in their permanency. For a long time after the pre-Cambrian veins had been formed no further mineralizing action occurred. We do not know of any Silurian, Devonian or Carboniferous gold deposits in North America. But in the Mesozoic age the great eruptions of the Cordilleran region began and the Cretaceous period was especially remarkable for the many mineral deposits formed throughout that region.

(TO BE CONTINUED.)

Strike at the Gambetta, Cal. Mine.

In last week's issue was an account of a recent strike at the Gambetta mine, Madera county, Cal., a region of which little is heard, but yet of some general importance. In Grub gulch, where the Gambetta, the scene of the latest rich strike, is situated, there are two distinct types of veins. There are fissure veins which occur in granite, and also in slate or schistose magnesian rocks, and when in these latter have a strike and dip across the inclosing rocks.



Gambetta Mine, Madera, Cal.

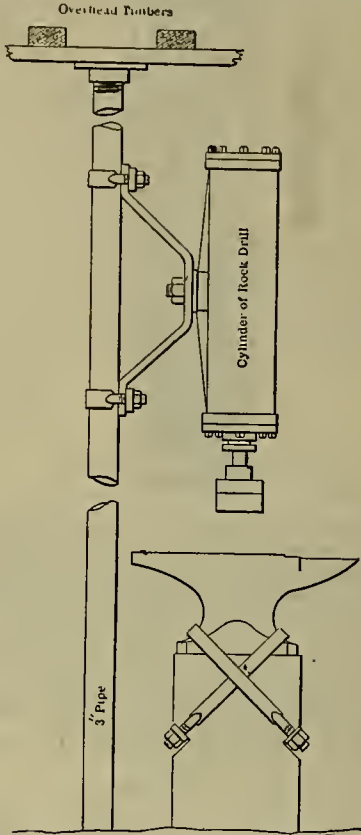
These veins usually have well-defined walls, are narrow, seldom exceeding 24 inches, and frequently carry a high-grade sulphide of iron, sometimes associated with arsenic; sulphides of lead, zinc and copper also occur. Much of the quartz is crystallized, calcite is of frequent occurrence, and not infrequently small greenish scales of a magnesian mineral occur. Among the veins of this type is the Gambetta mentioned in "Mining Summary" on page 166.

Most of the mines of Madera county differ from those just described and form the second type of veins referred to. These occur in fine-grained mica slate; conform nearly with the slates in both strike and dip and are often found associated with granite dikes. The quartz occurs as an infiltration, saturating the slates and sometimes forming solid masses of quartz, but usually the slaty structure of the original rock may be very plainly seen. The shoots occur in a series of lenses, sometimes following one another in a straight line. In this case one wall is often well defined, the fissure evidently being one of displacement as well as of fracture. More commonly, however, the quartz lenses, while following a general trend, lie at an angle, the ends sometimes overlapping. Again, several lenses of varying sizes are found in a zone of several feet wide, and not only the quartz, but the slaty material of the zone are mined and sent to mill. Of this type of mines there are many examples. Among them are the mines of the Savannah group, the Starlight on the same lode, the Fresno Enterprise, and nearly all the mines about Coarse Gold.

LEADVILLE, COLO., probably has more assaying work than any city of its size in the country. There is a great deal of assay work done in Denver, Salt Lake and San Francisco.

Rock Drill as Blacksmith's Hammer.

A correspondent writes the American Machinist as follows: "While visiting the Elkton mine at Cripple Creek, Colo., last summer I was interested in the ingenious way in which a rock drill had been rigged up to take the place of one or two blacksmith helpers in the blacksmith's shop. The drill, minus the tripod, was fastened to a vertical support. An ordinary anvil was fixed in a position under the ram, and the necessary air connections were made with the cylinder. When a blacksmith has some heavy hammering to do he has some one, as usual, to man-



age this contrivance, while the smith takes care to have the blows struck in the proper place, as with a steam hammer, except that the blows are not as heavy, but a sight more numerous for a given space of time. At the time that I saw this improvised steam hammer in operation the blacksmith was working down a piece of steel or wrought iron, about 3 inches wide at its widest part, 1 inch thick at its thickest part, 2½ feet in length, tapering in both width and thickness, and the hammer appeared to be doing excellent service. It appeared to me to be a very simple, effective and quite inexpensive apparatus, especially considering the fact that it, excepting the hammer head, was rigged up from material to be found in any mining outfit, and that it could be very easily resolved into its original parts and their former duties resumed, since neither drill nor anvil suffers any from this somewhat unusual use."

Water Measurement in the Yukon.

In the Yukon an "order-in-council" has been passed defining what is understood by the miners' inch, and providing a method of measurement according to the following table:

Dimensions of Orifice in Inches.		Head in Inches Over Center.	Discharge in Cu. Ft. per Min.	Number of Miners' Inches of 1½ Cu. Ft. per Minute.
Wide.	Deep.			
6	2	6 25	11 99	17 98
12	2	6 25	24 25	36 38
18	2	6 25	36 39	54 59
24	2	6 25	48 70	73 05
4	4	6 25	15 71	23 56
6	4	6 25	23 57	35 35
12	4	6 25	47 30	70 95
18	4	6 25	71 65	107 48
25½	4	6 25	101 58	152 37

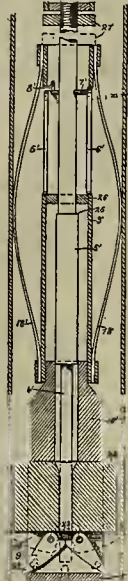
Large quantities of water for mining may be measured at any convenient point by discharging over weirs, through orifices. Smaller quantities of water, where delivered from ditches, flumes or canals into small ditches or flumes, shall be measured at the point of diversion of the branch ditch or flume. It shall be taken from the branch ditch, flume or canal through a box or reservoir, arranged at the side, and the water shall have no appreciable velocity of approach. The orifices shall be vertically at right angles to the delivering water way, and the edges and corners shall be square and sharp, and the top, bottom and sides at right angles to the pressure board, and the discharge shall be freely into the air. The distance between the sides and bottom of the orifice shall be at least three times the least dimension of the orifice.

Mining and Metallurgical Patents.

Patents Issued September 16, 1902.

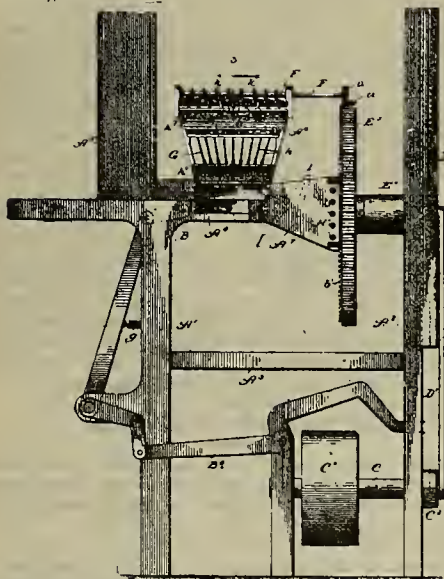
Specially Reported and Illustrated for the MINING AND SCIENTIFIC PRESS.

MACHINE FOR PERFORATING PIPES.—No. 708,763; E. R. Graham, Bakersfield, Cal.



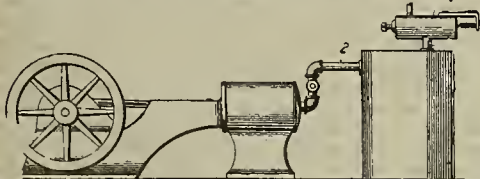
Combination of rod adapted to extend into casing, mandrel or spreader carried at end of rod, sleeve in which mandrel is slidable, longitudinal slots in sleeve, projections on mandrel extending into slots, head in connection with sleeve, radially operating knives carried by head, mandrel adapted to engage knives to force latter outwardly against casing, means for holding head at any desired point in casing, and collar carried by mandrel adapted to contact with end of sleeve when mandrel engages knives, whereby movement of mandrel through head and sleeve may be limited.

DRILLING MACHINE.—No. 708,995; W. E. Butler, Bedford, Ind.



In drilling machine, combination of suitable frame, reciprocating slide, plurality of drills located above path of slide, plurality of drills located at rear end of traverse of slide, master gear, plurality of shafts perpendicular to master gear, serving to operate first-named drills, shafts having gear connection to periphery of master gear, and shaft parallel to master gear serving to operate last named group of drills, last named shaft having gear connection with lateral peripheral margin of master gear.

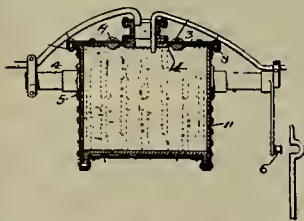
HYDROCARBON FEEDER FOR EXPLOSIVE ENGINES.—No. 709,428; F. B. Warring, San Jose, Cal.



Combination with carburetor of engine, casing having separate interior oil supply and vacuum chambers, latter having connection with carburetor, having also end opening, valve stem movable in casing, valve carried by stem and controlling port between

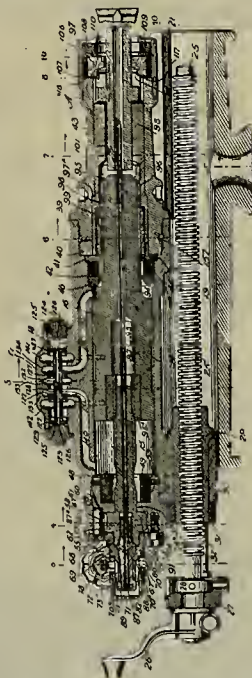
oil supply and vacuum chambers, piston on stem within vacuum chamber, retracting spring connected with stem, guide for opposite end of valve stem.

GENERATOR FOR CHLORINE GAS.—No. 709,004; T. Edwards, Ballarat, Australia.



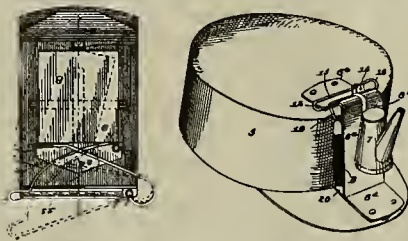
A generator for chlorine gas, of semi-cylindrical form having flat top, journals near top projecting laterally upon which generator may rock, dome surmounting flat top, gas pipe leading therefrom, covered opening in flat top to one side of dome.

ROCK DRILLING ENGINE.—No. 709,022; J. G. Leyner, Denver, Colo.



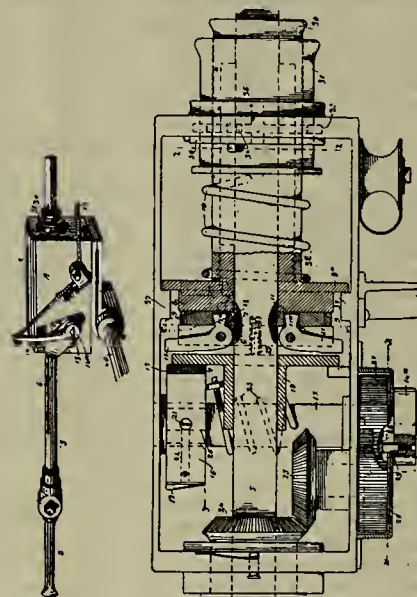
In rock drilling engine, combination with cylinder and piston, rear cylinder head, supplementary cylinder head having rearward hub projecting, of ring portion clampably secured to supplementary cylinder head, circumferential groove in inner periphery of ring, water inlet member, arranged on ring to intersect circumferential groove of ring, provided with hose connection at one end, and valve at opposite end adapted to control water inlet and circumferential groove of ring, axial slots in hub of supplementary cylinder heads, intersecting circumferential groove in ring, and axial bore in supplementary cylinder head provided with tapering portion, tapering sleeve adapted to fit taper portion of axial bore of head, extending beyond head's hub end, nut threaded to end of sleeve, adapted to bear against hub's end, axial bore in sleeve, plurality of radial slots in tapering sleeve extending through its shell into its axial bore, water conveying tube fitting loosely in bore of tapering sleeve, adapted to be clamped to sleeve by threaded nut at its end, and hood secured over end of hub of supplementary cylinder head, arranged and adapted to form closed water passage from axial groove in hub to end of water conveying tube.

MATCH SAFE ATTACHMENT FOR MINERS' LAMP HOLDERS.—No. 709,452; J. A. Brown, Pictou, Colo.



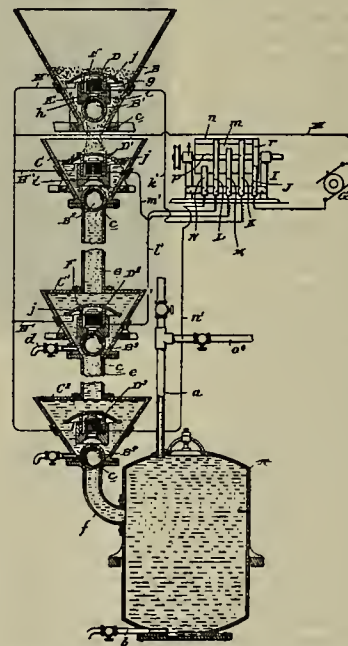
Combination with lamp holder of class described, of matchbox pivotally mounted on inner surface of holder provided with hinged lid, wire connected at one extremity with hinge pin of lid, extending outwardly beyond lamp holder on one side, where it is bent and carried in opposite direction suitable distance where it is coiled around pin on holder, finally bent downwardly, carried across matchbox, its free extremity passed through loop or eye formed on lid.

ROCK DRILL.—No. 709,191; R. Avery, Sausalito, Cal.



In a drill, a casing, a drill har of which is guided and slidable within casing, mechanism by which drill har is first retracted and subsequently turned, consisting of pawls and cams by which pawls are caused to grip and retract drill har, shaft upon which cam is carried, spur gear loosely mounted upon shaft having ratchet wheel turnable in unison with it, lever arm fixed upon shaft through which power is transmitted to turn it, spring-pressed pawl, carried by lever and normally out of operative contact with ratchet teeth whereby shaft and cam are moved before pawl engages ratchet, second spur gear engaged by first mounted upon shaft with casing, and bevel gears through which motion is transmitted to turn drill bar when pawl has engaged with ratchet, spring surrounding first-named shaft whereby shaft and parts carried thereby are returned to their normal position after pull upon lever has been released.

ORE LEACHING APPARATUS.—No. 709,135; J. Brown, Tonopah, Nev.



Apparatus for leaching ores comprising tank adapted to contain water or other liquid, conduit connected to and extending upwardly from tank having plurality of chambers, hopper disposed above upper chamber, ball valves for controlling discharge of chambers and hoppers, electro-magnets disposed above valves and adapted when energized to raise same, hoods and deflectors arranged in chambers and hopper above electro-magnets, electro-generator, movable commutator, circuit wires connecting magnets, generator and commutator; being adapted to change circuits and condition of magnets.

PROCESS OF SEPARATING ALUMINA FROM SILICA.—No. 708,561; A. Kayser, Buffalo, N. Y.

Separating alumina from silica, which consists in heating mixture containing alumina, silica, lime and soda in proportion of two molecules of soda to one molecule of alumina, two molecules of lime to one molecule of silica, to cinderling temperature, leaching out aluminate of soda thus formed and recovering alumina from solution.

Mining Summary.

Specially compiled and reported for the
MINING AND SCIENTIFIC PRESS.

ARIZONA.

COCHISE COUNTY.

T. H. Collins, secretary Calumet & Arizona Co., says the company expects to start their smelter at Douglas Nov. 1. The smelter will have a capacity of 300 tons daily.

C. A. Heberlein is in charge of the Black Diamond mine, Dragoon range, 20 miles from Bisbee, where thirty-five men are working and developing the property.

The Old Terrible—known as the Golden Rule—is being developed. There are thirty-five men employed there.—The Golden Rule Co. is putting in twenty stamps now and will put in twenty more as soon as the machinery arrives. The Cananea, Yaqui River & Pacific Railroad will run within 2 miles of the property.

At Pearce J. Brockman is manager Commonwealth mine. Eighty stamps are in operation. These stamps crush 230 tons of ore daily. There are 200 men employed on the Commonwealth night and day shift, with three shifts of eight hours on the underworkings. The mine timbers, framed at San Pedro, Cal., shipped to Cochise in carloads, are hauled to Pearce in the same manner as they haul oil—five or six oil wagons in a line, containing each from forty-five to ninety barrels, and then with a team of twenty-six horses the trip of 16 miles is made daily.

GILA COUNTY.

The Old Dominion Copper Co. at Globe shut down on the 11th. Three hundred men are out of employment. The reason is the present low price of copper and the extortionate railroad charges demanded by the Gila Valley, Globe & Northern Railway, with whom the company has been carrying on negotiations for a lower rate for some time.

The Prescott Realty Co. is reported to have just closed a \$500,000 deal with New York people on 400 acres of land adjoining the Old Dominion and United Globe properties.

MARICOPA COUNTY.

The Socorro Gold Co., near Wickenburg, are having ore tests made to determine the kind of plant to install in connection with the new 20-stamp mill.

The Black Rock Co. has men at work on the Powell & Manchus group, northeast of Wickenburg. The mineralized zone is 800 feet in width and several thousand feet long, the richest portion being a body in the center—a pay streak about 4 feet wide, assays on which give \$12 free-milling gold. Following this streak, a shaft has been sunk 200 feet and three drifts, from one of which a crosscut has started. The ore being brought up from the 200-foot level shows the same values as that on the surface.

Near Wickenburg, Superintendent Cree of the Fort Pitt & Arizona M. Co. will develop the property in the Buckhorn basin, 2 miles south from the Keystone.

MOHAVE COUNTY.

Klingman reports the transfer of the Leland Mitchell group of mines was closed by the payment of the full amount—\$500,000. The new company may build a railroad from the Santa Fe near Franconia to the mines, or will prevail on the Santa Fe to build the line. There are 14 miles of the grading complete; all that is necessary is to lay the ties and steel. Mills can be erected on the mesas, where estuary water can be obtained at a depth of 30 feet. The Leland-Mitchell group of mines is near the Boundary Cone, across which the 35th parallel north latitude runs.

The owners of the Planet propose resumption of work Oct. 1, to open the mine to a depth of 1000 feet.

Work on the Catherine mine of the New Comstock group is progressing; ore is being opened up in the drift.

The mines owned by J. McGregor in the Eldorado Canyon country are sold to Eastern men.

YAVAPAI COUNTY.

At Congress, the Congress Gold Co. employs nearly 500 men. The new shaft is down 800 feet.

Near Yarnell the mill on the Model mine is completed. The ore runs \$13 per ton gold. The Planet-Saturn people are reported to be figuring on taking hold of the Yarnell and making a string of mining camps from Fool's Gulch to the top of Yarnell hill. Twenty men are working at Fool's Gulch; W. A. Clark, manager.

A smelter for the Iron King will be erected near Jerome—a 200-ton water-jacket, on the north side of the gulch from which the mine is opened, east of the boarding house, high enough up the

hill to take advantage of a large dump for slag. Thirty men will go to work when Superintendent Giroux returns from Nevada.

At Octave are now employed about 150 men in the mine; men in the mill, store, cyanide and other places in the camp make the total force employed by the company about 200.

The Jerome News has it from a reliable source that W. A. Clark and his associates in the Equator M. & S. Co. will erect a smelter on their property on Equator hill, about 4 miles south of the town of Jerome.

Phoenix reports a disastrous fire at the Planet Saturn mine in Fool's gulch, in which a son of Superintendent W. A. Clark was burned to death.

CALIFORNIA.

HUMBOLDT COUNTY.

The Cordella Heald, a small steamer equipped with a dredger, is in the Klamath river for several weeks, prospecting and preparing for river bed mining. Commencing near the mouth of the river, the men propose to work up the stream, moving slowly or rapidly according to results obtained. The craft is fitted with appliances for warping the board up stream over the riffles. The dredger is an agitator which loosens the mud and gravel.

LASSEN COUNTY.

The Golden Eagle M. & M. Co., Hayden Hill, has sold all its property to the Lassen Mining Co., Sloss Bros., Benjamin, Hunt & Meredith, who have been actively developing it. A 100-ton cyanide plant will be put in. E. H. Benjamin will have charge.

MARIPOSA COUNTY.

Merced G. M. Co. has filed the annual statement of its affairs with the Silver Bow, Mont., county clerk. It shows that the capital stock is \$2,250,000, of which \$1,500,000 is actually paid up. The amount of indebtedness is given as \$61,795.90. The report is signed by A. S. Bigelow, president, and W. J. Ladd, secretary, who, with J. S. Bigelow and F. Klepetko, constitute the board of directors.

NEVADA COUNTY.

At the North Star mines 150 men are at work. Twenty-five stamps are running. The North Star shaft is 2400 feet deep. The central shaft is 1600 feet deep perpendicularly. A new 260 H. P. engine is going in and a triple expansion duplex pump.

At the Empire mine, Grass Valley, the main incline shaft is nearly 2800 feet deep. About 120 men are employed. Sinking the Omaha shaft 300 feet further has begun, superintended by E. Berry. About forty men are employed.

The Union reports the old Nichols mine has resumed operations, J. L. Larimer superintendent. A two-compartment shaft is begun. Oil will be used as fuel.

Preparations are being made to start up the Ironclad again; work was suspended pending the installation of a large pump.

At present there are about 620 men employed in Nevada county mines.

PLUMAS COUNTY.

A \$1200 nugget was recently taken from a piece of mining ground on Jamison creek, in gravel that had been worked over several times.

J. D. Whitney and associates have bought the New York mine, near Greenville, for \$25,000. Improvements will be made and the mine opened up and worked.

SAN BERNARDINO COUNTY.

F. M. Miller, local manager Leland Mitchell M. Co., in charge of surveyors laying out sites for a milling plant on the Colorado river below Needles, will build the Gold Road mills there. The statement is made that the matter of a railroad from a point on the Santa Fe near Franconia to the Leland mines was recently taken up with some of the officials of the road, and that the building of the line is assured. The road will be built as far into the mountains as it is possible to carry on traffic, and then a spur will be extended to the properties near the summit of the range. In this way all the output of the mines can be reached and conveyed by train to the point of reduction. A rate has been made to the Needles for the companies that will be as low as can be obtained to any point in Arizona, and which rate is said to be not over 50 cents a ton. The company make the statement that the reason for the building of the mills in San Bernardino county is the high rate of taxation in Mohave county, Arizona. The Klingman Miner says: "It is also understood that all the plants will follow the example of the Leland and unite on the installation of great power plant at the river, from which point all the machinery at the mines will be driven."

SAN LUIS OBISPO COUNTY.

H. B. Gleason of Los Angeles has men at work, 5 miles from San Luis, on ore showing \$14 per ton.

SANTA BARBARA COUNTY.

After having spent nearly \$50,000, the Craciosa Oil Co. has struck a gusher on the Harris ranch, near Casimira, about 2 miles from the Careaga oil wells. The well is producing at the rate of 250 barrels daily. Several wells are now being sunk. George Crocker and other San Francisco men are the principal stockholders.

SHASTA COUNTY.

F. E. Ware, of the Mount Shasta G. M. Co., says the retimbering of the 350-foot shaft of the Mount Shasta mine on Clear creek has been concluded and extraction of ore from the bottom of the shaft will be resumed. A drift will be run from the 350-foot level and the shaft be continued to 400 feet. At the Summit group of copper mines in the Backbone district, owned by his people, the crew is to be increased.

Frick & Bemis, on Middle Creek, will incorporate and develop the Illinois group. The ledge shows 2½% copper, some gold and specimens of graphite. The tunnel is now in 150 feet.

G. F. Greaves has charge of work on the Summit mine, 7 miles west of Kennet, under bond to the Mount Shasta Mining Corporation.

W. C. Oakes, of Sonora, has the Golden Star quartz mine, east of Downieville, and will sink a shaft on the vein.

At the Papoose mine, Jim Crow canyon, twelve men are now employed. The tunnel is advanced 60 feet. The ditch is being enlarged preparatory to putting in air compressors.

G. A. Von Krusze, owner Sybil mine, French Gulch district, is shipping ore.

SISKIYOU COUNTY.

At the Rusby mine, 15 miles from Yreka, men are putting in a 40 H. P. boiler. New hoisting machinery is to be added and all arrangements made to sink 200 feet.

At the Schroeder mine, Deadwood, twenty-six men are supplying the mill with ore.

Eight men are developing the mine recently bought by G. V. Gray on Cherry creek.

At Rollin, L. D. Ball expects to block out 200,000 tons of ore before next spring, which he estimates will mill \$5 per ton.

In the Evening Star mine J. Daggett has ten men at work.

TRINITY COUNTY.

A six months' bond has been taken by Spokane men on the Enterprise group of quartz claims near Coleridge.

The Cie Fse hydraulic mine has closed down for the season.

The Weaverville Journal says the Enterprise group and 10-stamp mill is bonded for \$50,000 to Hays & Stevens of Spokane. The last mill run of twenty-one tons, made two weeks ago, resulted in 37½ ounces in gold, worth \$17.25 per ounce.

The Buckeye M. Co. is opening a mine on Buckeye creek, 2 miles from Carrville. The Morrison Gulch mine, Coffee creek, will build a new flume.

The Golden Jubilee has closed down temporarily to make repairs and arrange for a new system of work.

The Headlight mine on Coffee creek will start up as soon as water comes. The owners are making additions to the cyanide plant and putting in larger tanks.

TUOLUMNE COUNTY.

(Special Correspondence).—The Bell mine, W. L. Rule superintendent, has a good ore shoot, just opened, and is going to put in a new 5-stamp mill.—The Street mine, R. Kinsman owner, is in good pay ore. There is a 5-stamp mill on the property and Mr. K. expects to add five more.

Tuttlestown, Sept. 24.

The Longfellow Cong. G. M. Co. will start their mill next week.

The Miegban G. M. Co. will work the Mount Jefferson mine. Ten stamps are to be started now and ten more next week.

The main shaft at the Grizzly mine is down over 1000 feet.

There is building a 4300-gallon oil tank for the Clio M. Co. at Jacksonville.

The Black Oak mine has resumed.

The Draper shaft has a depth of 570 feet. The company is just about completing a 5-stamp mill alongside of the former one, which will give a capacity equal to about fifteen stamps.

At the Prudhomme a shaft has been sunk 300 feet. A mill is on the ground. Sulphurets worked realized \$295 per ton.

The Puerto Fino, A. W. White, superintendent, has a shaft down 235 feet. The ore is base; 11% sulphurets give a value of \$390 per ton. They have a two-drill compressor and for fuel use wood.

At the Hazel Dell, near Sonora, Superintendent Colpe will drive a tunnel from the river level to strike the vein at a depth of 900 feet, the tunnel to be 4600 feet long. When finished it will drain the mine and permit working at less expense.

Work is resumed at the Hard Tack.—

At the Lost Fox is a ledge of ore which assays \$4 per ton.—The Chapparel mine, owned and operated by F. Wenzel of Sonora, is showing a body of free milling ore.—A contract has been let to run 500 feet of tunnel on the Mayflower group, on the south fork of the Tuolumne river, near the Buchanan. This mine has a good ledge with a 10-stamp mill on it.—The Georgiana has been bonded by San Francisco men. The property is near the Grizzly and owned by Floyd, Sharwood & McTarnahan. Fifteen men are at work.—E. C. Holmes has a bond on the Great Wonder mine, on the east extension of the Buchanan.

YUBA COUNTY.

The California Debris Commission on the Yuba river improvement will receive proposals until October 16th at noon; if the bids are accepted work can be started about December 1st. Barrier No. 1 is to be constructed at the Harriman farm, near the Parks Bar bridge; in the report of the Commission it is described as a dam with a by-pass.

The following is from the Tidings-Telegraph: "The group of mines in Brown's valley under the management of Julian Sontag, and comprising the Pennsylvania, Dannebrog and Hawkeye, have been sold to E. W. Johnston of Marysville for a San Francisco party, supposed to be T. J. Hibert & Co. The price is said to be \$60,000."

COLORADO.

CHAFFEE COUNTY.

Jones & Denham, owners of the Independence mine at Turret, have sold an interest in that property—approximately 45%—to Salida and Iowa men for \$50,000 cash. Jones & Denham retain control. The mine's output will pay the cost of development and for additional machinery.

The Salida smelter's eighteen ore bins have a capacity of 25,000 tons. It will handle considerable of Leadville's low-grade ore.

CLEAR CREEK COUNTY.

The Georgetown Courier says the Rothschild G. & S. M. Co. is steadily advancing its tunnel in the town of Argentine, 4 miles beyond Argentine pass. The tunnel work is being done by Maxwell & Cleaves as contractors and is in 1300 feet. The company owns about 100 entire and fractional claims. The tunnel has already cut about ten veins.

R. Willis is organizing a new company to operate in the Idaho Springs district. The property is opposite the Lamartine, eight full claims and a tunnel site of 3000 feet to start on a cross vein 8 inches in width in the center of the breast of the tunnel.

Near Silver Plume, B. C. Catren has consolidated the Dunderberg, Brown, Coin, Smuggler, Silver Ore and Terrible mines, about 500 acres of Sberman and Brown mountains. He will operate forty air drills and also erect a mill building for 500 tons daily. Sixty men are employed on the outside at present. The Terrible shaft is down 1400 feet; it will be pumped out, retimbered and sunk to a depth of 2000 feet.

CUSTER COUNTY.

The Maverick mine shaft near Rosita is being sunk. The Custer M. & R. Co. has engaged W. Cochran, formerly with the Bassick mine, to manage the Maverick. Assays show eighty ounces of silver to the ton.

DELTA COUNTY.

A strike is reported in a new district 12 miles from Hotchkiss.

EAGLE COUNTY.

At Red Cliff, in the California mine, Mrs. J. E. Dunne, manager of the mine, has installed machinery worth \$10,000 to assist in the further development of the property.

FREMONT COUNTY.

The U. S. R. & R. Co. is reconstructing the smelter recently bought near Canyon City and will spend \$75,000 in the new work. The present management uses the Bartlett method for smelting lead and zinc. One hundred men are employed. Some of the ore treated will come from Montana, Utah, Arizona and New Mexico. The present monthly payroll of the plant is \$8000.

GILPIN COUNTY.

The Consolidated Investment Co. has been organized in Kansas City to work the Vassar claims and Graham tunnel, in the Vermilion district.

The Running Lode mine, within the city limits of Black Hawk, is owned by the Gower Mines Syndicate, Ltd. The production for the past month was 170 tons concentrating ore, all of which was treated at the Newton mill at Idaho Springs. In addition to this there were produced about eighty tons of smelting ore which were shipped to the Denver smelters. This class of ore gave returns of \$100 per ton. All of this product is

coming from the eighth and ninth levels. Superintendent Nelson of Saratoga will unwater the Iron and Pewabic shafts, Russell district. The Iron shaft is over 600 feet deep; the Pewabic shafts are about 400 feet in depth.

M. D. Draper, superintendent Town Topics G. M. Co., operating the East Notaway group in Russell and Lake districts, is making regular shipments to the stamp mills and sampling works at Black Hawk and to the Golden smelter. Returns on the smelting ores give \$200 per ton, and another lot of ore gave values of \$30 per ton for the tailings. Some free gold is found in the workings.

Near Central City, Superintendent Hoskins is sinking at the Carr mine, on Boh-tail hill. The shaft is down 800 feet and will be continued to 1000 feet. The smelting ore is hauled by wagon to the sampling works; the mill stuff is sent over the aerial tramway; seventy men are at work.

HINSDALE COUNTY.

At Lake City the Dupre Co. is shipping two carloads a week of high-grade gold ore from the Isolde mine.

The Hidden Treasure Co. employs fifty men in its mine and mill.

The Tabasco Co. have their power plant, tramway and mill completed and in running order.

A three-compartment shaft, 4½x15 feet, is being sunk by the Auric Co. to cut both the Ute and Ulay veins.

LAKE COUNTY.

The Leadville News-Dispatch says there is less than 20 feet of water in the El Paso mines, and that will be pumped out the present month. It was thought that the property would not be pumped out before Oct. 10th. Four months ago Superintendent Newell started his first work, and has erected a new plant, unwatered 25 miles of workings, lowering the water 500 feet.

In the property of the Home M. Co. leased to J. Evans he has a body of low-grade chlorides. He is daily hoisting thirty tons; it runs 300 ounces in silver and from 40% to 50% lead.

Superintendent McPhee has opened up a body of iron ore in the Home.

OURAY COUNTY.

A 10-stamp mill will be put in at the Brooklyn mine, near Chattanooga. The low-grade ore is being put on the dump, the high-grade is being shipped to the smelter at Durango; average three cars per week; values from two to three ounces in gold and silver. Last month the smelter returns were \$3500; the cost of mining and treatment \$800.

PITKIN COUNTY.

Aspin mine owners contemplate a reduction in the royalties charged lessees from 30% to 50%. In addition to the reduction in royalties the mine owners project hoisting the waste for the lessees, thinking they have done their part in breaking the rock and conveying it to the cage. A reduction in the blacksmith charges for sharpening drills is also under consideration.

SAN JUAN COUNTY.

Silverton says the concentrating mill, fifteen tons capacity, near Burro bridge, is completed and will operate on Robert Bonner ores.

A strike is reported on the Copper King, Boulder mountain, San Juan district.

SAN MIGUEL COUNTY.

Telluride reports development work being pushed at the Nellie mine, in Bear creek basin; twenty stamps are dropping.

The Telluride Coal M. Co. has let a contract for driving the tunnel another 100 feet. When this is completed arrangements will be made for building a tramway, 2500 feet in length, from the mine to the railroad at San Miguel. The vein shows nearly 5 feet of a high-grade coal. The Alta mill is treating 100 tons ore per day.

The Four Metals M. Co. owns the Carl Murray group at Telluride and property at Silverton. The company says it will construct its own reduction plants at Telluride and Silverton, these plants to cost \$100,000.

SUMMIT COUNTY.

Near Breckenridge the American Gold Dredging Co.'s dredge in the Swan valley has done good work. The company is now operating on the high banks of the Peabody placer in Gold run gulch.

The Gold Pan Placer M. Co. is handling the heavy seepage water in the pit at Breckenridge. A 1180-gallon capacity valve bucket is being used to unwater the hole, so that the pump can be cleared. The bucket or haller weighs seven tons.

E. E. Busby, superintendent Admiral G. M. Co., 2 miles from Wheeler, is driving a 1200-foot tunnel through hard rock. To drive this tunnel at minimum cost he proposes to put in a 100 H. P. water wheel to run the air compressor for the air drill. The water will be carried out of the Ten-Mile river in a boxed flume, which empties

into a string of 40-inch pipe, which carries the water to pen-stock, where water wheel is located. The Goldpan Co. has the general supervision of placing the plant in position.

TELLER COUNTY.

Cleaning up the low-grade dumps of Cripple Creek district is being pushed by A. H. Heller, who is operating the Arequa mill. So far he has worked over sixteen dumps and recovered \$26,000 in values. The lowest values treated was \$3.50 a ton, the highest \$7 to the ton. At the present time he is working three shifts in the cyanide part of the mill, and is daily treating eighty tons low-grade ore.

The Clinton Con. M. Co. has a tunnel projected 3000 feet to cut Cow mountain at the depth of 2000 feet.

Recent shipment of fifty tons of ore from the Wild Horse mine gave returns of \$25,000 for the shipment.

The recent strike on the Mary Cashen is gaining in value with development.

Work has been resumed on the properties of the Cripple Creek M. & D. Co.

The first annual report of the United States Reduction & Refining Co. was submitted to the stockholders at their first annual meeting on the 24th inst. The company expended \$12,116,195 20 in acquiring the property and plant. The income during the year from the various plants under operation amounts to the sum of \$1,368,673.01. In addition to this amount, the company received as premiums from bonds and interest a sum sufficient to make the income for the year reach the total of \$1,373,849.48. Among the items of expense are the following: General expense of all kinds, legal and official salaries, advertising, taxes, etc., \$152,668 71; cost of maintaining the idle plants for the year, \$13,015 99; cost of organization, \$21,066 99. During the year the company declared two dividends, one on preferred stock, amounting to \$176 886, and the other on common stock, amounting to \$118,038. After paying out the various amounts there was left to be added to the surplus of the company the sum of \$470,809.09. The company, employing chlorination, has made reduction on the old charge for treating the leaner products. Formerly this company charged about \$7 per ton for handling material carrying \$10 per ton or less. The present schedule is \$5.75 per ton, which includes transportation charges from mine to mill.

F. Johnson, general manager Stratton Cripple Creek M. & D. Co., gives the idea that mining operations upon the extensive Stratton estate will go on as usual on the lines laid out in the mind of the late W. S. Stratton when he undertook the work several years ago.

C. C. Hemming has a new option on the Morning Star and Fleming claims for \$50,000.—The United States R. & R. Co. has made a cut on the rate of treatment for low-grade ores of the Cripple Creek district.—A small vein of high-grade ore has been cut on the Elizabeth Cooper claim of the Doctor-Jack Pot Co.

The Little Cut Diamond Con. G. M. Co. has incorporated, taking over the holdings of the Lasca G. M. Co. and the Little Cut Diamond M. & M. Co., Cripple Creek.

At the Empire State, Bull hill, the work on the big veins lately opened is in the nature of development.

T. B. Burbridge will work the C. O. D. Lessees on the Morning Glory property are active and meeting with good success.

Two sets of lessees are making regular shipments from the north end of the Mary McKinney Co.'s property.

Arequa mill is treating the dump rock of the camp on a large scale.

IDAHO.

ELMORE COUNTY.

(Special Correspondence).—The Idaho-Richmond G. M. Co., at Rocky Bar, is doing development work and taking out ore that averages \$60 per ton. They expect to drive a tunnel 600 feet and erect a mill when they have finished the tunnel. The ore they are taking out is paying dividends.

IDAHO COUNTY.

A. Wilson, manager Mayflower Co.'s property at Martin, adjoining Mount Bolland, has a group of locations that have been opened up with such good results that he is now erecting a small gold mill on Lava creek.

R. M. Sherman is manager two new companies to work the American Eagle and Fish Hawk groups on Siegel creek, about 9 miles south of Elk City. He has bought from Finch & Campbell the 10-stamp mill which they erected on the Ajax property, in Dixie. This mill will be moved to Siegel creek.

LEMHI COUNTY.

At the gold-bearing properties of the Eudora M. Co., 5 miles north of Salmon City, Manager W. A. Stanton, who is owner of a half interest, will erect a cyanide plant, the appearance of one-half of 1% lead having made it necessary to abandon

amalgamation, which has been going on in a 10-stamp mill erected a short time ago, the new plant to treat fifty tons daily at the start and to cost about \$28,000.

LINCOLN COUNTY.

At Minidoka two dredgers are being worked continuously by Burroughs Bros., by which 5000 yards of gravel are being daily handled with success. Along the margins of Snake river many are washing the sands with rockers and earning day's wages.

SHOSHONE COUNTY.

(Special Correspondence).—The Gold Hunter M. & S. Co. here are daily treating about 100 tons of crude ore in their mill, employing sixty men. They are shipping the concentrates to the American S. & R. Co. J. S. Olin is superintendent. The Gold Hunter Co. has been operating the Yolande claim, taking out ore hut parties owning five-sixteenths of the Yolande have an injunction against the company enjoining them from taking out any more ore. The report is current that the Gold Hunter has no ore; that all the ore they have taken out was from the Yolande. The Hunter, it is claimed by the management, has plenty of ore, and they will continue to operate on their own claims. They developed the Yolande while working the Hunter. They have a shaft on the Yolande through which they take the ore from the Hunter. The Gold Hunter people own eleven-sixteenths of the Yolande.

Mullan, Sept. 20.

The Cœur d'Alene reports a settlement of the dispute between the Cœur d'Alene mine owners and the smelting trust. The railways consent to reduce the freights \$2 a ton, and the smelting company makes a cut of \$1 a ton on its charges. In addition there are other concessions which make the reductions amount to about \$4 a ton in the case of most of the mines. At the same time, the mine owners get the right to increase their shipments in the aggregate from about 8000 to 12,000 tons a month. Shipments under the new scale have begun. It is expected the force of men in the mines affected will be increased about 25%. The new arrangement is expected to mean increased profit to the mine owners amounting to \$100,000 a month, or \$1,200,000 a year. This is done without raising the price of lead, which is fixed at 3½ cents a pound. The conference at Chicago was attended by D. M. Hayman, president Frisco Con. Co., representing the mine owners; Traffic Director Stubbs, representing the Harriman lines; a representative of the Hill interests and of the smelting trust.

C. Sweeney of the Empire State-Idaho Co. says: "The settlement is rather complicated. Under the old schedule the ore was taxed a flat rate of \$9 a ton for treatment, but the freight charges were graduated and were \$10 for ore carrying less than \$50 a ton, on the basis of the full valuation for the metal contents; \$12 for ore carrying between \$50 and \$65 and \$14 for ore carrying more than \$65. Under the terms of that, most of the shipments from the Cœur d'Alenes took the middle class rate, amounting in all to \$21 a ton. Now the railways cut the rate \$2 a ton for freight in each case, and the smelter lowers its treatment charge to \$8 a ton, which means a cut of \$1. In addition there is an important change in fixing the manner in which the determination of the freight rate is fixed. The smelters have always paid for only 90% of the lead contents and 95% of the silver values in the ore. Suppose that the ore carries 58% lead and twenty-five ounces silver. At 3½ cents a pound for lead and 50 cents for silver, the total assay value of it is about \$53 50. However, the amount which the smelters would pay for the ore would be considerably less than \$53 50, since there is the 10% toll on lead and the 5% deduction on silver. With these deductions made, the ore runs less than \$50 a ton. Under the new deal the value of the ore is supposed to be, not its full contents, but the price after deductions by the smelter have been made. Therefore, in this case, the freight and treatment rate now would be \$16 a ton, instead of \$21 a ton, as formerly. That is a cut of \$5 a ton. In other cases the cut is only \$3 a ton; so we take \$4 a ton as the average reduction. We are also allowed substantial increases in the amount of ore which we can ship. Under the new arrangements there is a nominal limit of 4000 tons a month, which is an increase of just 50%. That means practically that we can ship up to the full capacity of the mines. We shall increase our force about one-third in order to handle the increased output."

The Standard and the Hecla are now allotted 2600 tons a month. They can ship up to 3000 tons. The Morning is raised from 2000 to 3000 tons. The other properties are increased correspondingly. Secretary Brush of the American S. & R. Co. says: "The lead miners of the Cœur d'Alenes can not build rival plants,

because we have signed a contract with them for a whole year ahead. Contracts last year were for 8000 tons a month. Since May the output has been 10,000 per month and our contracts for next year call for 12,000. We have a contract with all the mines except one, which sends ore to the Pacific coast. There is no possibility of the establishment of rival plants, and I think the amount of ore contracted for will be more than the Cœur d'Alenes can produce."

There will be a meeting of the stockholders of the Standard and the Hecla companies on Oct. 6 to act upon the plan for consolidating the two companies, with a capital of \$3,000,000.

Injunction has been issued restraining the Gold Hunter M. & S. Co. from taking any ore from the Yolande claim, which adjoins the Hunter M. Co.'s property at Mullan. A mining engineer makes affidavit that from Sept. 21, 1899, the alleged time the Gold Hunter M. Co. started operations on the Yolande claim, the company had, up to the month of January, 1900, taken 15,906 tons of ore, valued at \$1,034,000, from the property, and that from that time until April 5, 1902, the company had taken out 7986 tons of ore, valued at \$480,000. I. L. Magee is manager Yolande M. Co.

Near Murray, the Paragon people are considering the construction of a concentrator next season, daily capacity fifty tons. They are sinking a shaft; at its completion a crosscut will be made to tap the ledge at a depth of 480 feet. About 1800 feet of work has already been done on the property in the way of crosscutting and tunneling; hoisting machinery is put in and a four-drill compressor will be installed.

The Cœur d'Alene M. Co. expects that its 5-mile ditch on the side of the hill to the north of the town, and which is to carry water to the placer grounds at the mouth of Dream gulch, will be completed Nov. 1. The company controls 3000 acres of land, and it is estimated that the gravel will yield 5 cents per square yard. The company is working forty men in the bed of Prichard creek; the bedrock there is 30 feet deep.

MICHIGAN.

HOUGHTON COUNTY.

The Lake Superior smelting works at Dollar bay are using coke instead of anthracite coal in the smelters, because of the coal strike. The same works are turning out Isle Royale copper in anodes for the recovery of silver by the electrolytic process, and are now casting the August product into anodes.

MONTANA.

CASCADE COUNTY.

C. W. Clark is securing a site for an additional smelter at Great Falls.

DEER LODGE COUNTY.

Work is resumed in the Cable property at Moose mining district, northwest of Anaconda. The property has not been worked since 1889, when it was closed down indefinitely. The property is under the charge of J. C. Savery, principal owner. Thirty men are employed at the Cable, under Superintendent Bacon.

FERGUS COUNTY.

R. E. Moulton projects a cyanide plant on the Alameda group of claims, near Gilt Edge.

GRANITE COUNTY.

(Special Correspondence).—The Montana G. M. Co. of Butte have recently brought in several retorts from their property, near Princeton, that averaged from \$900 to \$1200 each. They are still sinking the shaft and expect to go about 100 feet deeper.

Princeton, Sept. 21.

The Montana G. M. Co. has five claims 25 miles from Philipsburg. The Sunday claim is being developed; a shaft is 100 feet deep and a tunnel is in 450 feet from the entrance. The shaft and tunnel are connected at a point 400 feet from the mouth of the latter.

Murray & Miller, lessees of the Lead King properties at Garnet, have a load of ore, on which the smelter returns yielded them \$184 per ton. The Lead King has been developed to a depth of more than 500 feet, the vein showing strong.

L. S. Parker has a lease on the Shamrock at Garnet, and will sink another shaft and also drift for the pay ore.

JEFFERSON COUNTY.

W. A. Clark is working the Mayflower, near Whitehall. The shaft is more than 1000 feet deep. Much of the ore is rich, some of it averaging \$300 per ton in gold, which is the only metal the rock contains. Some tellurium ore has been found in the property. In only a few places in Montana has this class of rock been discovered. A few samples taken from the Mayflower were valued at \$10 per pound. Several tons worth \$100 each were

shipped from the Mayflower to the Butte reduction works two years ago.

LEWIS AND CLARKE COUNTY.

Fire destroyed the plant of the Columbia G. M. Co. at York, near Helena, last week; loss, \$35,000. The 10-stamp mill and the cyanide plant were destroyed; \$14,000 insurance. About 150 men were at work. If the company decides to rebuild, six months will be required.

MADISON COUNTY.

Ten Minneapolis men have bought the Galena mining property, 12 miles from Pony, 3 miles from Norris, for \$60,000. The Galena comprises two claims containing a vein of ore from which a quantity of gold has been taken by leasers. It is the intention of the new owners to begin active development at once under the direction of J. H. Briggs, who will stay with the proposition a year. Sinking will be continued to 1500 feet. A reduction plant will be built to treat the product, provided the showing warrants.

MISSOULA COUNTY.

Near De Borgia, the Deep Creek G. M. Co. has shut down its hydraulic elevator for the season. The men will be engaged in putting in new blocks in the flume, the old ones being worn out after two seasons' run. Manager D. Cromie says white pine will be used for the work, as it is more satisfactory than cedar.

SILVER BURR COUNTY.

Manager Wethey will rebuild the Butte Reduction Works at Butte.

NEVADA.

ESMERALDA COUNTY.

L. K. Mau, one of the original locators of the Pactolus group of mines, 35 miles from Luning, is in San Francisco to bring California men to Luning with a view to purchasing the property.

EUREKA COUNTY.

During the week ending September 12 the shipments of ore by rail from Eureka district amounted to 35,710 pounds from the Excelsior mine and 163,570 pounds from the Eureka Con.

HUMBOLDT COUNTY.

Raser City, the scene of the Donnelly mountain strike, has twenty-five men doing assessment work. There are no deep shafts or tunnels in the camp. No work of a permanent character will be undertaken before spring. About 200 tons of \$60 ore are sacked on the dumps. There are six ledges so far discovered, some 2 feet in width.

LINCOLN COUNTY.

Searchlight is on the western slope of the Opal mountains and near the center of a mineral belt, from El Dorado canyon 30 miles to the north to Newberry mountain, 25 miles to the south; width about 15 miles bounded on the east by the Colorado river. The country rock is chiefly porphyry and granite. The largest concern operating in the camp is the Quartzette Co. of Boston, Mass. The company owns several patented claims, a 20-stamp mill at the river, connected by a railway 12 miles long, with their chief mine, the Golden Treasure, in which 4000 feet of work has been done, proving the ledge by shafts and drifts. Their shaft is down 500 feet on the ledge and is being sunk deeper. On the 500-foot level the ore is wider and richer than in the upper levels. The July run at the mill was 1400 tons of ore, which yielded \$4000 in bullion. Between the 400 and 500-foot level the ledge is over 30 feet wide.

The Southern Nevada M. & M. Co. has the Blossom, 3 miles north of the Golden Treasure. They have 10 stamps in operation.

The Duplex Co. is working the Searchlight mine down nearly 400 feet with their shaft. When they reach the 400 foot level they intend putting in a pump and expect to have plenty of water to operate their 10-stamp mill, now erected and ready to commence work. The survey of the Salt Lake Railroad and Oregon Short Line is within 20 miles of this district.

At Silver King mining district, 45 miles northwest of Pioche, the Silver King reports an ore body 9 feet in width, carrying 6000 ounces silver per ton, creating a stampede from Pioche to that district.

The organization of Bamherger's De Lamar's mines has been perfected and the shares distributed among the members of the Eastern syndicate which controls the property.

LYON COUNTY.

The Oakland Con. G. & S. M. Co., Dayton, represented by Wiltz & Paramore, will timber the tunnel, put up buildings and develop the mine.

In the Nevada Chief mine, Rockland, in tunnel No. 1, on the new ore body, in an upraise, the ledge is 4 feet wide and there is a 20-inch vein, from which ore is being sacked for milling.

NYE COUNTY.

In twenty mining claims belonging to

Griffin & Cutting, 11 miles west and 12 miles south of Tonopah, the country rock is porphyry, schist and lime. From the deepest prospect opening so far half a carload of shipping ore has been extracted, showing 400 ounces silver per ton and \$30 per ton gold. There is a small percentage of lead in some of the ore. Water is scarce and a long way off.

The Bonanza says at the Fraction development work is progressing with sixty men. No. 1 shaft is near the 400 mark. At the big shaft they expect to reach the 400-foot before Nov. 1. They are doing fast work putting in a sot a day at this shaft and are sinking at the rate of 5 feet every twenty-four hours. Two hundred sacks of ore await shipment.

STOREY COUNTY.

The water in the Chollar Combination shaft on the Comstock stands 160 feet 4 inches below the measuring point. At the C. & C. shaft the water is being held at a convenient point below the 2150 level. Elevator No. 2 was recently taken up and a new throat piece and nozzle added to its length, after which this elevator was lowered into place and is now in steady operation, except when stopped a few hours each day to save pressure water.

P. L. Flanagan says he has bought from the Donner L. & W. Co. at Lake Tahoe the Van Schmitt dam for \$40,000, the Nevada P. & L. Co. to pay \$22,500 and the residents on the meadows to pay the balance.

Recently miners of Storey county made a protest against the S. P. railroad securing a patent on land of more value for mineral than agriculture. The matter was given a hearing before Register Gallup and the railroad withdrew the disputed land from the map, which leaves it free to the miners. The miners placed two men on the stand who testified to the worth of the land for its prospective sources. Mr. Fulton, who represented the company, did not make a contest of the matter and allowed the miners all they claimed.

WASHOE COUNTY.

Manager Hopkins of the Great Western M. Co. at Steamboat Springs has installed heavier machinery and believes there will be no difficulty handling the hot water in sinking the three-compartment shaft deeper.

The clean-up from the first run of ore from the Wedekind and Bell mines returned 4600 pounds bullion, proportion of gold one ounce in each 100 ounces of silver.

WHITE PINE COUNTY.

F. C. Williams, manager Ohio G. M. & L. Co., has a \$50,000 bond and lease for one year on a mining claim at Ely, containing a deposit of tungsten.

NEW MEXICO.

GRANT COUNTY.

The Kat & Kittens M. Co., of which G. A. Freeman of Cooney was manager, has passed into the hands of the Home G. & C. Co., a corporation of Canada. It is expected to sink the 150-foot shaft 130 feet deeper and do crosscutting. If the results are then satisfactory a cyanide mill will be erected.

R. H. Batchelder says a new company has been organized to build a smelter at Aberdeen, composed of Philadelphia men, to exploit a process of lead smelting invented by C. Wessell, which is claimed to be more economical than the present process.

OREGON.

BAKER COUNTY.

J. P. McGuigan, general manager Alamo Con. M. & M. Co.'s property at Alamo, 23 miles from Sumpter, will build a 20-stamp mill there this fall.

At Baker City, G. W. Daines, of the Daines M. & M. Co., says he will this fall erect new machinery on the property in the Greenhorn district, known as the Belcher, including a stamp mill of sufficient capacity to take care of the ore.

P. R. Bishop is superintending development work at the Climax mine, Cracker Creek district.

Sumpter reports a strike in the Cracker Oregon mine, owned by the Turnagain Arm Co. of Minneapolis. The ledge is 3 feet wide.

GRANT COUNTY.

(Special Correspondence) — The Red Boy Con. G. M. Co., head office at Baker City, mines and plants at Lawton, is now developing its water rights, which cover the principal streams and natural reservoirs within a drainage area of 60 square miles. The largest reservoir, which is Olive lake, has a storage capacity of 83,000,000 cubic feet. The water will be used under a natural head of 770 feet and will develop 2000 H. P.

More than 10,000 feet of development work has been done on these properties. At a depth of 700 feet the veins are united and have a width of over 16 feet. The mine was equipped at a cost of \$225,000. The steam plant consists of three boilers,

20x48 Corliss engine running hoist, air compressor, 20x36 Corliss engine running compressor, air receivers, pumps, drills, etc. The mill consists of a 25-stamp battery with a capacity of sixty to eighty tons per day, eight concentrators and crushing machinery. A cyanide plant treats the concentrates from the mill. E. Juessen, Spokane, Wash., is consulting engineer.

Baker City, Sept. 20.

JOSEPHINE COUNTY.

The Alameda M. Co., Galice district, have four quartz claims and fifty acres of gravel lands. They have let a contract for running a long tunnel to C. B. Mattison.

LANE COUNTY.

In Fohemia mining district there are three stamp mills running at the Helena, Musick and Champion, all owned by the Oregon Securities Co. Twenty teams are hauling ore and concentrates to the end of the railroad. The Knob mine is in operation. The Le Roy Co. has put in the first steam drill of the district in its group of eight claims. The greatest depth is in the levels of the Musick, 400 feet, and the Helena is down about as far. The Oregon & Southeastern Railroad is completed 12 miles from Cottage Grove and 10 miles more will be finished this year. It will be 38 miles long and will be entirely finished next year. A company has been organized by P. J. Jennings to cut a tunnel 1 1/2 mile long from the head of Champion basin through Grouse mountain to tap the Helena and Musick and bring the ore to the terminus of the railroad.

SOUTH DAKOTA.

LAWRENCE COUNTY.

The Carbonate Silver Extraction Co. is working the tallings at the old Iron Hill stamp mill in Carbonate camp. The ore carries an average of twelve ounces of silver to the ton. It is possible to leach four to five tanks a day. The company is obtaining an extraction of 75% to 85%.

At Lead, the Pluma G. M. Co. has bought the Hawkeye M. Co., and is planning extensive operations. The Hawkeye property, which includes nine acres of millsite, on which is the 40-stamp mill at Pluma. The ground joins that of the Pluma Company, in northeast Lead, and, with the Pluma, is surrounded by the property of the Homestake. This purchase gives the Pluma Company eighty-six acres, figuring in two millsites, both at Pluma. The Hawkeye mill is connected with the Hawkeye mine by a cable tramway 4600 feet long, which crosses the original Pluma group, and will be used exclusively in the conveyance of ore from the various mines. The mill is 500 feet lower than the mine. Forty more stamps will be added to the mill for cement ore, that lies across the Hawkeye and Pluma groups of claims. The old Pluma mill is 20-stamp, up Whitewood creek from the Hawkeye. In this mill a test run was recently made on cement ore; average value \$5 42 a ton. The company says it can convert this into bullion and deposit it in the United States assay offices at Deadwood for \$1.75 a ton.

At Terry, the Horseshoe M. Co. has begun excavating for the cyanide and stamp mill above the Mogul shaft in the Bald mountain district. The completed mill will be of 1000 tons capacity; 500 tons will be pushed to completion as soon as possible and the rest finished later. One hundred and twenty stamps will be put up now and 240 by Jan. 1st. The plant will be in two separate buildings, one to comprise the power house and crusher, the other the stamps and cyanide tanks. The ore will be carried by belt conveyors from the crushing plant to the cyanide plant, 80 feet square; the first part of the cyanide plant 450x250 feet, the finished plant to be 150 feet square. The B. & M. R. R. will begin spur tracks as soon as the mill is laid out. C. M. Fuller of Denver will have charge of the construction of the plant. H. Collins is foreman. A. Guionneau is engaged on the new plant. R. W. Rodda is superintendent.

UTAH.

BEAVER COUNTY.

Near Milford, at the Ben Harrison mine, twenty-four men are installing the new machinery and doing development work.

IRON COUNTY.

Leaching the ores of the Ophir M. Co., at Stateline, is to be relegated to the plain cyanide process. Superintendent Parker says with the use of cyanide a saving of 90% is possible. The hyposulphite process afforded a saving of 85%.

JUAB COUNTY.

(Special Correspondence).—The Centennial-Eureka M. Co., Eureka, are producing seventy-five to eighty tons per day, and have already shipped to United States smelter at Bingham Junction about 400 tons. They are now loading the second

lot for shipment. They only have part of a force working at present, but as soon as the smelter is completed and in operation will put on a full force.

Eureka, Sept. 23.

Manager McIntyre has run an upraise in the new channel of gold-bearing ore at the property of the Mammoth M. Co. Tintic, with the rock maintaining a satisfactory average; a recent carload of ore brought \$9000 at the smelter.

At the Lower Mammoth, Tintic, controls show 121 ounces of silver, 6 3/4% copper and 90 cents gold, the ore having a gross valuation of \$67 62 per ton.

Near Silver City, the Dragon Iron mine, L. E. Ritter, manager, sends 100 tons of flux daily to the furnaces of the American Smelting & Refining Co.

SALT LAKE COUNTY.

The New Red Wing Co., at Bingham, has two new ore bodies. Manager Orem says in virgin ground at a vertical depth of 400 feet from the surface in the Silver Hill ledge the lessees are wheeling out ore that averages 45% lead, fifteen ounces silver and \$1 gold per ton.

The management of the York Co.'s Bingham property, after driving west from the main Petro incline 1000 feet, has encountered the ore body looked for at a point over 1000 feet below the apex of the ledge.

On the authority of a local smelter manager the Tribune states that the furnaces of Salt Lake valley are consuming 2000 tons of ore daily, with the tonnages, flux and fuel increasing it to 3000, yet the capacity of the plant is being daily increased. It is estimated that nearly 10,000 mouths derive their food through one or another of the various avenues radiating from the smelter furnaces. There are four more to be blown in at Murray's \$1,000,000 plant, one more of those now installed at the Bingham Con., with the battery of five, with which the new \$650,000 smelter being completed by the United States Smelting Co., to follow. Out of Milford the Majestic Co. is engaged in the erection of another independent smelter and still another is projected by the Newhouse interests at Frisco and Bingham.

SUMMIT COUNTY.

(Special Correspondence).—The Ontario S. & M. Co. are now down in shaft No. 3 1900 feet, and expect to sink same to 2000-foot station; also doing a great deal of prospecting and development work. Shipping 2000 tons to 2800 tons of ore per month; employ 200 men.

Park City, Sept. 23.

Manager Brooks figures that five cars of concentrates from the California M. Co., 135 tons, averages \$45 per ton, lead, silver and gold.

The Park Record reports shipments of ore from the Mackintosh sampler for the past week as follows:

	Pounds.
Daly West.....	2,604,000
Ontario.....	1,014,000
Anchor Con.....	439,000
California.....	51,000
Loring.....	150,000

Total number of pounds.....4,258,000
Silver King.....1,440,100

Grand total.....5,698,100

WASHINGTON COUNTY.

R. C. Lund says the wagon road between the Dixie mines and the site for the new smelter is completed.

At Silver Reef the new cyanide mill is in process of construction.

WASHINGTON.

OKANOGAN COUNTY.

W. H. Plummer, president Methow R. & S. Co., says he will build a railroad from Pateros up the Methow valley.

PIERCE COUNTY.

The Pacific Improvement Co. has cut the price of Carbon Hill coal to steamers at Tacoma and Seattle. Heretofore the coal operators have been getting an average of \$3 25 per ton for coal furnished steamers at that port. The local managers of the Carbonado mines have now entered the fields and offer to supply steamers coal at \$2 10. Some of the competing mines are meeting the rate, while part of them are playing a waiting game. It is claimed that the coal cannot be mined and sold for \$2 10 at a profit, and that the Pacific Improvement Co. must soon increase price. Before the adoption of oil by the Southern Pacific, the entire output of the Carbon Hill mines was shipped from Tacoma to Oakland, Cal., being used largely on the Southern Pacific ferries. When oil came into use about a year ago, the mines at Carbonado were closed down.

SNOHOMISH COUNTY.

The Northern Pacific railroad has bought of J. D. Rockefeller the Everett & Monte Cristo railroad, 60 miles in length, from Everett to the Monte Cristo mines. The road was built ten years ago, after

Rockefeller had purchased the Monte Cristo mines. It lost money for several years, but is now on a paying basis.

FOREIGN.

BRITISH COLUMBIA.

(Special Correspondence)—In the Oyster group of mines at Camborn, on Fish river, consisting of the Rossland and Criterion claims, owned by Wm. Pool, is struck free gold ore in the quartz lead.

The N. W. D. Co. of Michigan, who own the Camborn group, will put in a 10-stamp mill and large saw mill and develop their properties.

The John L., at Gerrard, on Tenderfoot creek, will put up a concentrating mill.

The Guena G. M. Co., on the Duncan Slope at Ferguson, have some high-grade gray copper ore.

The Silver Cup mine at Ferguson recently made a shipment of 1200 tons to the Trail smelter, netting \$195,000. They struck a body of gray copper ore in the 400-foot level.

The Metropolitan M. & M. Co. at Trout Lake are working the Triune and Metropolitan, and have 4 feet of gray copper in the Triune which will average about 300 ounces silver to the ton.

Ferguson, Sept. 20.

The Sullivan smelter at Marysville is expected to be in active operation within ninety days. The Canadian Pacific originally signed a contract to deliver the Sullivan ore to the smelter for 62½ cents per ton, and to that end began the survey for a railroad. Later it was found impossible to build the road, as the grade could not be eliminated sufficiently within the 6 miles traversed. As there was no special mode of delivery specified in the contract, the railroad company now is building a tramway to convey the ore. This will be but 1½ miles long and will cost \$27,000, as against \$150,000, the cost originally estimated for the completion of the railroad.

Slocan says the Enterprise mines will supplement its concentrating plant on Ten Mile with the Elmore oil process.

At Moyle the St. Eugene mine is closed down, the pump pulled out of the shaft, the machine drills taken out of the mine and cleaned and put away and the miners all given their time. Two men will be employed to watch the mine. Two years ago the company was employing nearly 300 men and its monthly payroll was between \$25,000 and \$30,000. It was shipping on an average of 2000 tons of concentrates every month, of a gross value of \$70 per ton. The fall in price accounts for the closing down of the mine. Manager Cronin says that the London price of lead must reach the £13 mark before a wheel will turn.

Rossland advances the suggestion that British Columbia lead producers form a combine in Canada and construct a smelter south of the boundary line to buy Canadian lead ore exclusively. The duty on lead ore is 1½ cent per pound; at this figure the Canadian lead miner would receive about \$250 for his product—\$1 per hundred higher than he obtains after marketing his lead on the London market and paying the reduction and freight charges. It is asserted that the miners would, as a set-off to the duty, have such profits as accrued to the smelter under existing conditions.

J. H. Mackenzie, general manager Le Roi mine and Northport smelter, on the coke supply question, says: The Crow's Nest Coal Co. controls workings at Fernie, Michel and Morrissey. At Michel there are 212 coke ovens now operating to their aggregate capacity. At Fernie there are 324 ovens, of which 160 are in full blast. At Morrissey there are no coke ovens, but the mines are producing large quantities of coal. The Crow's Nest Coal Co., therefore, has only sufficient coal on hand to operate 388 of its coke ovens out of a total of 536 ovens available, the reason for this being that the dark ovens are located at Fernie, while the coal to keep them running is at Morrissey. The ovens now blown in produce 450 tons of coke per diem, while the possible production of the entire equipment of ovens is sixty-seven tons of coke daily. If the coal company is enabled to secure a rate for the transportation of coking coal from Morrissey, where it has an ample tonnage now unused, to Fernie, where it has 164 coke ovens lying idle for want of coal to blow in with, their output of coke will immediately be raised to the maximum tonnage of 670 tons daily. Approximately, the requirements of the Kootenay smelters is 360 tons daily, making it evident that if the coal company is thus able to keep all its coke ovens in operation it will have over 300 tons of coke daily wherewith to supply the demand outside of the Kootenays, of which the Northport smelter, with a consumption of 200 tons of coke daily, is the principal factor. The Northport smelter is so closely identified with Rossland that it may be regarded as a British Columbia enterprise. One and six-tenths ton of coal is

required to manufacture a ton of coke; the charge of the individual ovens is six tons and seventy-two hours are consumed in the process of converting coal into coke; under the new management the miners are supplied with all the cars they require to move the coal broken down in the stoves, and in other particulars their operations are so expedited as to largely enhance their earning powers. Where men were only able to produce four to five tons of coal daily they are able to produce nine tons or thereabouts, and their remuneration is largely increased as a result. This practically amounts to a considerable increase in wages.

Phoenix says over 10,000 tons of ore have been sent out to local smelters in the last seven days. The Sunset smelter has again blown in and the Mother Lode smelter has put in its second furnace blast.

This week the Granby smelter treated 4930 tons, a total of 212,310 tons for the year.

The report of the operations of the Le Roi mine and Northport smelter for July shows tonnage shipped from the mine in July of first-class ore 14,492 7, second-class 1677.5 tons, aggregate 16,170.2. First-class ore averaged \$17.67 per ton, second-class \$16.35. During the month the expenditure on mine account was \$51,385.53. The cost of breaking and delivering ore on the railroad cars for the month was \$2.87 per ton. The cost of loading second-class ore from the dump was 27.3 cents, which, added to the 2½ cent tax for the month, brings it to 29.3 cents per ton. The cost of delivering first-class ore on railroad cars, including all mine expenditure other than cost of second-class ore, was \$3.50 per ton.

Trail reports regular ore shipments averaging 400 tons daily received at the smelter, but inconvenience experienced through a shortage of coke. The roast heaps are growing, but coke is not coming in fast enough to justify the blowing in of the copper furnaces. Two furnaces are in readiness to start, but will not be blown in until regular supply of coke is received.

The Ball Mountain mines, near Donald, have been sold for \$1,000,000.

Paragraph 2 of Section 5 of the Mineral Act Amendment Act, 1898, is interpreted that, should any free miner perform assessment work on his claim during any one year to the value of one hundred dollars or more in excess of the amount required to be done in any one year by the Mineral Act, the right thereby given such free miner of recording a certificate of work done to the value of each one hundred dollars, so as to cover his assessment work for an additional year in respect of each one hundred dollars in excess, is exercisable only during the year in which such excess shall be performed.

The report from the Northport smelter shows that 22,625.1 tons were received at the plant during July. Of this 19,965 tons was treated as follows: Roasted ores, 10,764.5 tons; raw Le Roi No. 2, 5008; raw Le Roi second-class, 2268 5; raw Le Roi first class, 1908. The gross value of the first-class ore treated in July is placed at \$256,086, and the net estimated profits on this class of ore is given at \$92,898 42. The gross value of dump ore was \$27,427.68. The estimated profits on this ore was \$15,450 09, the total estimated profits being \$108,348.51.

MEXICO.

BAJA CALIFORNIA.

At Alamo, on Aurora-Princessa mines, the 10-stamp mill on the property is worked fifteen hours a day. The company proposes to sink another 50 feet; total depth, 350 feet. The company is also sinking a new shaft on the Viznaga mine. The 10-stamp mill of the Viznaga mine is preparing to crush.

CHIHUAHUA.

The Boston & Chihuahua M. Co., organized under the laws of Colorado, will develop the Shamrock annexes of sixty pertenencias at Terrazas. G. W. Boyce is manager of the properties and will put in air compressors and hoists.

COAHUILA.

Trouble is reported at the Avino mines as a result of the importation of Chinese laborers to take the place of the Mexican furnace men, who have threatened to strike. A detachment of rurales was sent to the mines on the appeal of Manager Flynn for protection. For several months the furnace men have been dissatisfied. Recently they demanded better pay. Avino is in the mountains, 13 miles from the railroad. The engagement of the Chinese was made through Torreon agents. There is little difficulty in getting the men, but the question of getting them to work without trouble is another matter. There is little doubt that the management will give them a chance to work, even if there should be no strike. It is not probable that there will be serious trouble at the mines.

SONORA.

Phelps, Dodge & Co. have begun development work on the Indiana-Sonora property at Cananea, by sinking six shafts. The camp is prosperous and continues to grow rapidly.

SOUTH AFRICA.

A dispatch from Johannesburg says that Mr. Rathbone, former Government Inspector of the Rand mines, has returned from a geological survey of the southern fringe of the great Witwatersrand basin. He established the existence of the main reef series through 20 miles which is favorably situated for working. The dispatch adds that, should the reports prove true, it means another Rand with the existence of all deep levels geologically proved.

Late London advices say the Government has decided that the new South African colonies are to be required to pay \$500,000,000 toward the cost of the South African war. The colonies are, however, to be allowed ample time in which to make this payment. It will not be collected until the extension of trade and expansion of revenue permit. Consequently the loan will not be floated for two or three years. Mining profits will probably be taxed 10% more than they were before the war, and money will also be obtained by granting all kinds of concessions and mineral rights.

SOUTH AMERICA.

BRAZIL.

U. S. Consul H. W. Furniss of Bahia, Brazil, reports upon diamonds and carbons, the latter being the stones used in diamond drills. The rock is eruptive; the carbon, by great heat and pressure, has crystallized into diamonds. With conditions perfect the diamond of commerce was produced; with less perfect conditions the carbon failed to crystallize and appears in hard, blackish masses of irregular shape, known in trade as carbon or black diamonds. The original rock is granitic, and mixed with this is a sandstone of different degrees of hardness and a conglomerate of rounded pebbles cemented by a very hard matrix, often resembling a dark-colored cement. Both sandstone and conglomerate are of more recent formation than the granite, and they contain the diamonds. These precious stones are thus not found in situ, but occupy their position as a result of fluvial action. The diamonds and carbons cannot be removed from either the sandstone or conglomerate because of the impracticability of breaking the rock without crushing the precious stones. The miners, therefore, work in the gullies between the rocks and in the cavities about them, depending upon the disintegrating influence of time and the elements, and the washing down of this debris into the ravines and river beds. The method of mining there employed is of a crude type. The cascalho or diamond-producing debris is mined in the open or by tunnels, and at the end of each week this accumulation is laboriously washed, either in a sluice with running water or in large wooden basins manipulated by hand. In another method of mining a diving bell is used, and in the Paragua river, near Tamandua, 100 native divers work the river bed, collecting the gravel into sacks, which are hoisted into canoes and taken ashore. Mr. Furniss says that, with improved machinery and modern methods, much better results could be secured. Some of the most productive locations cannot be worked because the water leaks in faster than it can be bailed out by hand; here, even, a good hand pump would much improve conditions.

The output of carbons now averages about 2500 carats per month, but the output is decreasing while the demand is constantly increasing. Mr. Furniss says that immense quantities of carbons exist in that region, but it will take well managed companies with large capital to mine them profitably. Carbons are classified as porous, or crystalline and good. The good stones are now worth at the mines \$24 per carat, if the stone is over ½ carat in weight; for stones of ½-carat to ¼ carat the price is \$7.20 per carat; carbons of less than ½-carat are mixed with refugio diamonds, worth \$48 per oitava. The porous carbons bring half these figures, but not more than 5% of the stones mined belong to this class. The largest carbon ever discovered came from the Lencoes district; it was found in 1895, and weighed 3150 carats. It was sold by the miner for \$16,000, one-fourth of this going to the owner of the claim; this stone was finally sold for \$25,400 and sent to Paris to be broken up into marketable pieces. The next big find was in 1901, when near the same place as before a carbon of 577 carats was unearthed; this was sold by the miner for \$17,380. The average size of the carbons found is six carats. All diamonds and carbons from that district are shipped to Paris and London from Bahia City.

THE KLONDIKE.

George Anderson, the Dominion Government trade commissioner to the Yukon, says that the output of gold in the Klondike region this year will be \$11,000,000 to \$12,000,000, or \$6,000,000 less than last year. The Canadians, he says, now control 70% of the trade of the British Northwest Territory.

Personal.

J. KENT is manager Elia M. Co., Telluride, Colo.

J. B. PAXTON has returned from Taos, N. M., to Joplin, Mo.

GEO. STEUART is now manager Purlitan mine, Yankee, Colo.

J. M. MCPHEE is superintendent Golden Wizard mine, McEwen, Or.

W. M. BREWER is ore buyer for the new Crofton, B. C., smelter.

F. E. LLOYD is superintendent Arizona G. & C. Co., Patagonia, Ariz.

HENRY PAULSEN is manager Standard S. & R. Co., Val Verde, Ariz.

M. H. JACOBS, Idaho State Mine Inspector, is in Spokane, Wash.

C. HENLEY of Central City, S. D., has gone to Ashantee, West Africa.

W. F. ENGLEBRIGHT has returned from Bear Valley to Nevada City, Cal.

L. CUMMINS is now superintendent Alpha Con. mines, Coarse Gold, Cal.

J. C. COX of Aspen is now assayer and chemist Camp Bird mine, Ouray, Colo.

E. BAMBERGER is superintendent Keystone Co.'s property, Park City, Utah.

C. P. ROSECRANS, manager Standard Copper Co., Clifton, Ariz., is at San Jose, Cal.

C. H. LINDLEY of San Francisco is in the Cœur d'Alenes, Idaho, on legal business.

F. R. WARDLE has returned to San Francisco from a two years' sojourn in the Orient.

C. S. MILLER has been appointed superintendent of the Arastra M. Co., Granite, Or.

J. B. GRIMWOOD is constructing engineer Nevada County, Cal., Gas & Electric Co.

S. V. SHERROD has taken charge of the Bolonitos group of mines, Guanajuato, Mexico.

J. N. MOSELY of Wardner, Idaho, has gone to Lima, Peru, on a prospecting expedition.

GEO. JOHNSTON of San Francisco is installing mining machinery in Placer county, Cal.

J. T. KESCEL, late foreman Anchor mill, Park City, Utah, is succeeded by W. Nichols.

A. HOULE has assumed charge as superintendent of the smelting works at Encampment, Wyo.

G. Z. EDWARDS, general superintendent Con. Mercur, Utah, gold mines and mills, is in New York City.

GEO. E. SANDERS of the Oro Grande mine has returned from New York City to Wickenburg, Ariz.

H. C. DONALD is general manager Silver Knight and Clifford property, East Klondike, Tonopah, Nev.

W. W. O'BRIEN has been appointed superintendent Stratton's Independence mine, Cripple Creek, Colo.

J. N. MCLEOD is in charge of the assaying department Miners' Ore Sampling Works, Black Hawk, Colo.

F. BOYLE is now superintendent Ivers-Judge group of mines, White Pine county, Nev., succeeding J. Weber.

H. L. SHIPPY of the John A. Roebing's Sons Co. has returned to New York City from a visit to London.

SUPERINTENDENT N. JUDSON of the Yankee Hill G. M. Co. has returned from Los Angeles to Columbia, Cal.

O. P. POSEY is at the Gold Roads group, Kingman, Ariz., where a large plant of mining machinery is to be placed.

PERCY L. FEARN, M. E., of New York, is in Idaho examining some gold properties in the interest of foreign capital.

S. A. KNOWLES is foreman Sun & Moon mine, Idaho Springs, Colo., succeeding A. Clute, who goes to southern California.

R. LIDEN, assistant superintendent British Columbia Co., has returned to Greenwood, B. C., from Spokane, Wash.

T. B. O'BRIEN of Madison county, Mont., is in Butte with tellurium ore, valued at \$10 a pound, from the Mayflower mine.

A. C. HUMPHREYS is now president Stevens Institute of Technology, Hoboken, N. J., succeeding the late Henry Morton.

H. A. SHIPMAN, late superintendent

Stratton's Independence Co., Cripple Creek, Colo., is to proceed immediately to London.

S. Z. MITCHELL, general manager Tacoma Ry. & Power Co., Tacoma, Wash., is succeeded by W. L. Dimmock of Richmond, Va.

GEO. H. LEWIS, general manager Crystal Water Co., Tonopah, Nev., is in San Francisco to get supplies for Tonopah's water system.

DR. SIMONDS of Simonds & Wainwright, mining engineers of New York, is examining gold mining property in San Luis Obispo county, Cal.

A. J. HUGHES of the Hughes Iron & Steel Works, Hughesofka, Southern Russia, is taking observations of American manufacturing methods.

PROF. A. VANDER NAILLEN, president of the School of Engineering of San Francisco, returned on the 19th inst. after an absence of five months abroad.

T. H. TRACY is enlarging the smelter plant and the new electric light plant to be built by the North American Copper Co. at Grand Encampment, Wyo.

THOS. WALSH of Colorado is back from Europe. He proposes to form a syndicate in the interest of King Leopold of Belgium to develop the mines in the Congo Free State, Africa.

W. C. GREENE, president Cananea Copper Co., is going to New York to attend a meeting of the stockholders, and says the company is turning out 4,000,000 pounds of copper every month.

J. MACGINNISS, vice-president of Montana Ore Purchasing Co., has returned from New York City to Butte, Mont. While East he engineered the organization of the United Copper Co.

GEO. W. MYERS, Pacific coast agent Chrome Steel Works, Brooklyn, N. Y., and the Masurite Explosive Co., New York City, has returned to San Francisco from a business visit to Tuolumne county, Cal.

T. J. GRIER, superintendent Homestake M. Co. of South Dakota, has been visiting the Treadwell mine, Douglas Island, Alaska. It is rumored in Deadwood that his visit was in behalf of J. B. Haggin, one of the controlling stockholders of the Homestake, who is locally reported to contemplate the purchase of the Treadwell.

Commercial Paragraphs.

A CONTRACT has been let to the Joshua Hendy Machine Works of San Francisco to erect a 20-stamp mill for the Red Cross mine, Washington, Nevada county, Cal.

THE Ogden Assay Co., who for many years have been located at 1429 Sixteenth street, Denver, Colo., have removed to more convenient and centrally located quarters at 1725 Arapahoe street, Denver, Colo.

THE Western Electric Drill Co., Butte, Montana, report the sale of two Durkee electric drills, including boiler, engine, generator, etc., complete to W. E. Sanders, Bonanza group of mines, Wisdom, Mont.

FAIRBANKS, MORSE & CO., through their manager at Salt Lake City, Mr. C. P. Mason, report the sale of a thirty-four H. P. gasoline hoisting engine for Tonopah, Nev., including a large bill of mining supplies, being a complete equipment.

THE California Electrical Works of San Francisco handle the new type Sunbeam lamp, which they consider more satisfactory than many lamps now on the market. They carry a good stock in San Francisco and expect to be in a position to make prompt shipments at all times. They say: "The Sunbeam lamp will maintain its initial candle power beyond the time when most others will fail, and this is the period when the real quality of a lamp is demonstrated."

THE Holthoff Machinery Co., of Cudahy, Milwaukee, Wis., gives a statement of large orders taken by them as follows: Dos Estrellas M. Co., Mexico, complete cyanide plant; Johnny G. M. Co., Salt Lake City, Utah, 10-stamp mill, complete with power; Silverton M. Co., Silverton, Colo., miscellaneous equipment, including power, for stamp mill; U. S. Reduction & Refining Co., Colorado City, Colo., roll shells; Buena Vista M. Co., Mexico, roll shells; Inguaran G. M. Co., Mexico, 6200 feet of pipe line; Milwaukee Gaslight Co., Milwaukee, Wis., ten large condensers and four large internal fire boilers; State Board of Control, Madison, Wis., internal furnace boiler for Waupun State Prison; Magnus Metal Co., Chicago, Ill., 150 H. P. internal fire boiler.

THE Eureka Fire Hose Co., of Jersey City, N. J., have decided to discard their present direct-current power transmission system and to adopt an alternating current system in order to reduce the cost of fire insurance where motors are used in

the presence of inflammable material. This step has been taken on the advice of one of the largest insurance companies of this country. The new apparatus includes one 75 K. W., belt-driven alternator, furnishing two-phase current at 7200 alternations and 220 volts; also exciter, switchboard equipment, slide rails, rheostats, etc. A number of induction motors have been purchased, including the following: five of 15 H. P., one of 10 H. P., five of 5 H. P. and three of 2 H. P. With these there will be furnished a switchboard feeder panel, completely equipped with instruments and switches. The entire electrical equipment has been ordered from the Westinghouse Electric & Manufacturing Co.

Books Received.

Some time ago this paper said editorially that mining and metallurgy, electrochemistry and scientific progress along these lines moved at so rapid a rate that books on those subjects were often antedated and behind time when issued from the press, and that it was largely to the current issues of the trade journals and technical press that seekers after advancement should look.

If there were any exception to be made to that assertion it would certainly be in such an instance as that of the four sumptuous volumes received this week, with the compliments of the local representative of the International Text-book Co. of Scranton, Pa. The title of the series is, "Metallurgy of Gold, Silver, Copper and Zinc." One of the four treats on hypophosphite chlorination, copper, lead, zinc, electro-metallurgy; another on milling, sampling, roasting, cyanide process; a third on engines, boilers, chemistry, assaying; the fourth on mathematics, mechanics and hydraulics. They are text-books, simple and elementary in some ways, with questions and answers, slightly after the fashion of school books, but with a wealth of detail and a simplicity of explanation that gives them real value. It is within bounds to say that there is something of interest and value to be found in these admirable volumes to any student or practitioner in the departments of applied science of which they treat. Not the least in point of merit is the full index in each volume. The work, as a whole, is designed for use by the International Correspondence School.

Catalogues Received.

7x10 inches, about 900 pages, quarto, half morocco, a big thing every way, is the massive and mammoth volume sent by the Mine & Smelter Supply Co. of Denver, Colo. It seems ridiculous to class such a volume as a "catalogue." It represents a tremendous lot of clever and expensive work. Were some one to write the history of such a catalogue from its first start in the brain of some man in the machinery department to its final completion it would be an interesting story. This is "Catalogue No. 15." The number of the copy sent to this paper is 873. Next to the volume sent out by Manning, Maxwell & Moore, it is the biggest thing in the machinery catalogue line received in this office this year. The man who got it up—A. M. Candee—deserves special notice, and the enterprising concern that issues it deserves special mention. The work is in ten sections; it takes in about everything that a miner or machinery worker uses in the way of appliances, in the line of the Mine & Smelter Supply Co., is superbly illustrated, sumptuously printed on heavy plate paper and weighs seven pounds and ten ounces. Ordinarily it is said, "A copy will be sent to any address," but the writer hesitates to make the usual assertion in this case. The postage on each copy is 57 cents, and the cost of each must be considerable. Still, our readers might try asking for a copy and see what the result is.

Obituary.

MAJOR J. W. POWELL, director of the Bureau of Ethnology at the Smithsonian Institution at Washington, died at Haven, Me., on the 23rd inst. He had been connected with the scientific work of the Government since 1861. His most notable work was his exploration of the Grand Canyon of the Colorado. He was the first man who went through the Colorado canyon its entire length from Green River station to the mouth of the canyon. Major Powell's work as director of the Government geographical surveys in the Rocky mountain region in the early seventies was of value. This Rocky mountain district was one of the four surveys of the Territories which in 1879, were combined into the present geographical survey. He had been director of the geographical survey for more than a decade, beginning in 1880.

Latest Market Reports.

SAN FRANCISCO, Sept. 26, 1902.

METALS.

SILVER.—Per oz., Troy: London, 23½d (standard ounce, 925 fine); New York, bar silver, 51½c, refined (1000 fine); San Francisco, 51½c; Mexican dollars, 43½c San Francisco, 40½ New York.

Seligman & Co., New York, say they will receive \$1,250,000 gold from Australia. The gold is due at San Francisco on October 6th. The South African gold consignment will amount to \$3,500,000.

Ladenburg, Thalmann & Co. say that \$500,000 gold has been consigned to them from Australia. It is due in San Francisco the latter part of October.

COPPER.—New York: Standard, \$10.75@11.25; Lake, 1 to 3 casks, \$11.75; carload lots, \$11.25; Electrolytic, 1 to 3 casks, \$11.50; carload lots, \$11.25; Casting, 1 to 3 casks, \$11.50; carload lots, \$11.25. San Francisco: \$14.00. Mill copper plates, \$17.00; bars, 18@24c. London: £52 13s 9d spot per ton.

According to the figures of Secretary Stanton of the Copper Producers' Association, the domestic production of copper for August, 1902, was the smallest since April and amounted to 25,296 tons, against 26,749 tons in July and 26,740 tons in June, but was about 4000 tons larger than in August, 1901. The exports in August, 1902, amounted to 12,429 tons, against 11,733 tons in July.

LEAD.—New York, \$4.12½; Salt Lake City, \$3.50; St. Louis, \$4.00; San Francisco \$4.50, carload lots; 4½c 1000 to 4000 lbs.; pipe 5½, sheet 6, bar 5½c; pig, \$4.75. London: £10 17s 6d per ton.

SPELTER.—New York, \$5.50; St. Louis, \$4.50; London, £19 per ton; San Francisco, ton lots, 6½c; 100-lb lots, 7c.

ANTIMONY.—New York, Cookson's, 9½c; Hallett's, 8½c; San Francisco, 1000-lb. lots, 10c; 300 to 500 lbs., 11c; 100-lb. lots, 13@15c.

TIN.—New York, pig, \$25.80; San Francisco, ton lots, 29c; 1000 lbs., 29c; 500 lbs., 29c; 200 lbs., 29½c; less, 30c; bar tin, \$3.35. London, £118 12s 6d spot.

PLATINUM.—San Francisco, crude, \$18.00 per oz.; New York, ingot, \$19.00 per Troy oz. Platinum ware, 75@80c per gram.

QUICKSILVER.—New York, \$48.00 large lots; London, £8 15s; San Francisco, local, \$46.00 per flask of 7½ lbs.; Denver, \$49.65. Export, \$44.50.

BABBITT METAL.—San Francisco, No. 1, 10c; No. 2, 7c; No. 3, 6½c; extra, 17½c; genuine, 35c; Eclipsé, 37½c.

ALUMINUM.—New York, No. 1, 90% pure ingots, 35c; No. 2, 90%, 30c to 34c.

SOLDER.—Half-and-half, 100-lb. lots, 19.50c; San Francisco, Plumbers', 100-lb. lots, 16c.

NICKEL.—New York, 50@60c per lb.; ton lots, 45@48c.

STRUCTURAL MATERIALS.

IRON.—Pittsburg, Bessemer pig, \$22.50; gray forge, \$20.50; San Francisco, bar, 3c per lb., 3½c in small quantities.

STEEL.—Bessemer billets, Pittsburg, \$31 and \$31.50; open hearth billets, \$33 and \$33.50; San Francisco, bar, 7c to 12c per lb.

CHICAGO CURRENT QUOTATIONS.

Bessemer	25.00@25.50
Foundry Northern 1	24.00@26.00
Northern 2	23.50@25.00
Northern 3	22.00@23.50
Southern 1	24.15@26.15
Southern 2	23.50@25.65
Southern 3	23.00@25.15
Forge	20.00@20.65
Charcoal	25.00@24.50
Billets, Bessemer	33.00@34.00
Bars, iron	1.85@1.95
Bars, steel	1.75@1.85
Rails, standard	28.00@30.00
Rails, light	34.00@40.00
Plates, boiler	1.90@2.00
Tank	1.75@1.80
Sheets, 26 store	3.25@3.40
No. 27	3.35@3.50
No. 28	3.45@3.60
Angles	1.75@1.80
Beams	1.75@1.85
Tees	1.80@2.00
Zees	1.75@2.25
Channels	1.75@2.25
Steel melting scrap	19.50@20.00
No. 1 railroad wrought	21.00@22.00
No. 1 cast, net ton	16.50@17.00
Iron rails	24.00@25.00
Car wheels	21.00@22.00
Cast borings	10.00@10.50
Turnings	14.00@14.50

CEMENT.—Germania, \$2.45; K. B. & S., \$2.80; Hewmoor, \$2.75; Trowell, \$2.75; Portland, \$3.00 per bbl.

LIME.—Santa Cruz, \$2.00; Roche Harbor, \$2.00 per bbl.

LUMBER.—(Retail): Pine, ordinary

sizes, \$20.00@22.00; extra sizes higher; redwood, \$22.00@23.00; lath, 4 feet, \$4.25 @4.50; pickets, \$19.50; shingles, \$2.35 for No. 1 and \$2.00 for No. 2; shakes, \$13.50 for split and \$14.50 for sawed; rustic, \$26.00 @32.00.

NAILS.—Per keg (list prices): No. 20d to 60d, Wire, \$3.30; Cut, \$3.30; 10d to 16d, Wire, \$3.35; Cut, \$3.35; 8d, Wire, \$3.40; Cut, \$3.40; 6d and 7d, Wire, \$3.50; Cut, \$3.50; 4d and 5d, Wire, \$3.60; Cut, \$3.60; 3d, Wire, \$3.75; Cut, \$3.75; 2d, Wire, \$4.00; Cut, \$4.00. Special rates for carload lots.

GENERAL SUPPLIES.

POWDER.—F. O. B. San Francisco: No. 1, 70% nitro-glycerine, per lb., in carload lots, 15½c; less than one ton, 17½c. No. 1*, 60%, carload lots, 13½c; less than one ton, 15½c. No. 1** 50%, carload lots, 11½c; less than one ton, 13½c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2*, 35%, carload lots, 9½c; less than one ton, 11½c. No. 2** 30% carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 728 kegs, \$1.50 per keg; less car lots, \$2 per keg.

CAPS.—3x, \$5.50 per 1000; 4x, \$6.50; 5x, \$8; Lion, \$9, in lots not less than 1000.

FUSE.—Triple tape, \$3.60 per 1000 feet; double tape, \$3.00; single tape, \$2.65; Hemp, \$2.10; Cement No. 2, \$3.00; Cement No. 1, \$2.65, in lots of 3000 feet and up.

CANDLES.—Granite 6s, 16 oz., 40s., 10½c per set; 14 oz., 40s., 9½c.

COAL.—San Francisco, coast, yard prices: Wellington, \$8; Seattle, \$6.50; Coos Bay, \$5.50; Southfield, \$8.00. Cargo lots, Eastern and foreign: Wallsend, \$7.00; Brymbo, \$7.50; Pennsylvania, hd., \$14.00; Scotch, \$8; Cumberland, \$12; Cannel, \$9.50; Welsh Anthracite, \$13.00; Rock Springs, \$9.50, long ton; Colorado Anthracite, \$14.00. Coke, \$10.50 per ton in bulk, \$13 in sacks; Sunnyside, \$8.50, long ton.

CHEMICALS.—Cyanide of potassium, 98%-99%, jobbing, 27@28c per lb.; carloads, 25@26c; in 10-lb. tins, 38c; sulphuric acid, in carboys, 66½ B, 2c per lb.; soda ash, \$2.00 per 100 lbs.; hypophosphite of soda, 24@30c per lb.; blue vitriol, 5½@6½c per lb.; borax, concentrated, 7@8c per lb.; chlorate of potash, 12@13c; roll sulphur, 3c; alum, \$2.00@2.25; flour sulphur, French, 3½@3¾c; California refined, 2@2½c; nitric acid, in carboys, 8c per lb.; caustic soda, in drums, 3@4c per lb.; Cal. s. soda, bbls., \$1.25 @1.50 per 100 lbs.; sks, \$1.05; chloride of lime, spot, \$2.50@2.60; nitrate of potash, in bbls, 8c; caustic potash, 10c in 40-lb. tins; sulphide of iron, 9c per lb.

OILS.—Lined, boiled, bbl., 57c; cs., 62c; raw, bbl., 55c; cs., 60c; lots of 5 bbls., 1c less; Lucol oil, boiled, bbl., 50c; cs, 55c; raw, bbl., 48c; cs, 53c. Kerosene—Pearl, per gal., 20c; Astral, 20c; Star, 20c; Extra Star, 24c; Eocene, 25c; Elaine, 22c; Water White, in bulk, 13½c; Mineral Seal, iron bbls., 19c; wooden bbls., 22½c; cs, 25c; Mineral Sperm, cs, 26½c; Deodorized Stove Gasoline, bulk, 17c; do., cs., 23½c; 86° Gasoline, bulk, 21c; do., cs., 27½c; 63° Naphtha or Benzine, deodorized, in bulk, per gal., 16c; do., in cs., 22c; Lard Oil, No. 1 bbl., 95c; cs., \$1.05; Neats-foot Oil, bbl., 70c; cs., 75c; No. 1 bbl., 52½@55c; cs., 57½@60c; Sperm, crude, 60c; Natural White, 65c; Bleached do, 70c; Whale Oil, cs, 55c.

WHITE LEAD.—Per lb., in kegs: Five tons and over at one purchase, per lb., 6c; 1 ton and less than 5 tons, per lb., 6½c; 500 lbs. and less than 1 ton, per lb., 7c; less than 500 lbs., per lb., 7½c; in 25-lb. tin pails, 4c per lb. above keg price; in 1 and 5 lb. tin cans, 100 lbs. per case, 2½c per lb. above keg price. Dry Lead—in bbls., 1 ton and over, 6c; do. in kegs, 6½c.

RED LEAD AND LITHARGE.—One ton and over at one purchase, per lb., 6c; 500 lbs. and less than 1 ton, per lb., 6½c; less than 500 lbs., 7c.

ASSAY LITHARGE.—Per lb., 8½c.

BISMUTH.—Subnitrate, per lb., \$1.60.

BONE ASH.—4c per lb.

BORAX.—Crystal, 7c; calcined, 25c.

CHROMIUM.—(90% and over) per lb., \$1.25.

COPPER.—Carbonate, 20c; Red oxide, per lb., 60c.

MAGNESIUM.—Per lb., \$3.00.

MANGANESE.—(90% and over) per lb., \$1.25.

MERCURY.—Bichloride, per lb., 90c.

MOLYBDENUM.—25c. per gramme; 1000 grammes=2½ lbs.

PHOSPHORUS.—(American) per lb., 80c.

SILVER.—Chloride, per oz., 75c; nitrate, 55c.

SODIUM.—Metal, per lb., \$1.00.

URANIUM.—Oxide, per lb., \$3.50.

ZINC.—Metallic, chemically pure, per lb., 50c.

ZINC.—Dust, per lb., 10c.

ZINC.—Sulphate, per lb., .04c.

(These prices are wholesale, f. o. b. San Francisco, unless otherwise noted.)

Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

ELEVATOR.—No. 708,755. Sept. 9, 1902. M. A. Clelland, San Francisco, Cal. Assignor to Cahill & Hall Elevator Co., of same place. This invention relates to improvements in elevators for buildings and like uses, and consists of a mechanism by which an elevator cage may be raised or lowered, and a suitable well or guideway; means by which said movable portion may be raised from any point at which it may be standing, and moved in either direction up or down to any other stated point where it may be desired to have the movable part stop. The mechanism enables the cage to be operated from any floor or station independent of the station at which the cage may be standing and by which mechanism the cage will be started from its position and caused to move either upward or downward, and an automatic mechanism by which the cage or movable part may be stopped at any other desired station without further attention.

MACHINE FOR PERFORATING PIPES.—No. 708,763. Sept. 9, 1902. E. R. Graham, Bakersfield, Cal. This invention is designed to perforate pipes, such as the casings of oil, gas and like wells, where it is desirable to perforate the casing at points above the bottom of the well, in order to let in the surrounding fluid which may afterwards be removed by pumps. It consists of a series of radially disposed punches or knives, a spreader or mandrel by which the punches are driven out-

wardly against and through the casing, and means for suspending the parts at any desired point in the well, together with means for retracting the punches and mandrel.

KILN BURNING APPARATUS.—No. 708,707. Sept. 9, 1902. G. F. and H. N. Gray and R. South, San Francisco, Cal. This invention is designed to provide a more effectual means for applying heat in burning brick, pottery and similar wares within the kiln. It consists in the arrangement of drip burners or supply pipes, passages through which fuel oil may be delivered into the desired portions of the kiln from above and the discharge regulated, and supply pipes through which the oil is conducted to the burners so that the chambers where the burning takes place may have the temperature gradually raised to first expel the moisture and drive it off and finally to complete the burning or baking.

DEVICE FOR THE MANUFACTURE OF PHOTOGRAPHIC CARD MOUNTS.—No. 708,675. Sept. 9, 1902. P. J. Stuparich, San Francisco, Cal. This invention is designed for manufacturing ornamental photographic card mounts in a single operation, and consists of a punch and die by which the center of the card is punched out to form an opening for the reception of the picture, and a supplemental annular die fitting around the shank of the punch having its face adapted to form an ornamental border around the opening simultaneously with the formation of the opening itself.

BOX FASTENING.—No. 708,702. Sept. 9, 1902. E. Fletcher, San Francisco, Cal. Assigned to Nailless Lid Box Co., San Francisco, Cal. This device is designed to removably secure box sections together without the use of nails. It consists in forming the covers with transverse grooves on the top near each end, in which grooves the separating strips may be placed, and in combination with these wires fit into grooves or channels in the covers or in the strips, and extending diagonally outward and downward, the ends are bent so as to be inserted into the sides of the box. The opposite side of the wires serves to lock the parts in place and they are removable by simply detaching the ends from the sides of the box.

SAFETY ATTACHMENT FOR HYDRAULIC NOZZLES.—No. 708,693. Sept. 9, 1902. P. Bouery, Weaverville, Cal. This invention is designed to provide a safety attachment in connection with the pivoted or swivel joints of nozzles which are employed to direct heavy streams of water as in the case of the hydraulic washing of gold-bearing earth and the like. The nozzle is turnable on trunnions on the pipe section. Arms are secured to the nozzle, turnable therewith, and segmental flanges are arranged on the pipe section so that the arms will engage with the flanges.

PACKAGE.—No. 708,696. Sept. 9, 1902. E. H. Davis, Mesa Grande, Cal. Assignor to Nailless Lid Box Co., San Francisco, Cal. The object of this invention is to provide a package for the

transportation especially of small fruits, raisins and like commodities which are to be displayed when the package is opened. The box or receptacle has a loose lid having transverse grooves across the top, half of a length sufficient to extend continuously across the top and be seated in the grooves. These half grooves embrace the sides of the receptacle and are arranged in a slanting manner having spurs at the terminals which may be driven into the sides of the box and thus hold the lid in place.

New Patents.

DEWEY, STRONG & CO.'S SCIENTIFIC PRESS PATENT AGENCY, 330 Market St., S. F., has official reports of the following U. S. patents issued to Pacific coast inventors:

FOR THE WEEK ENDING SEPT. 16, 1902

- 709,451.—BAO MAKING MACHINE—J. F. Ames, Portland, Or.
 709,191.—ROCK DRILL—R. Avery, S. F.
 709,135.—ORE LEACHING MACHINE—J. Brown, Tonopah, Nev.
 709,300.—FENCE POST—J. Buchtel, Portland, Or.
 709,590.—STEAM TRAP—J. Campbell, Port Blakely, Wash.
 709,301.—MACHINE GUN—E. M. Capps, San Diego, Cal.
 709,207.—ANIMAL EXTERMINATOR—L. N. Cornett, Nativiland, Cal.
 709,210.—TUMP WAGON—J. J. Eagen, Oakland, Cal.
 709,211.—PUMP—R. W. Elliott, Oakley, Cal.
 709,487.—STOVE PIPE HOLDER—J. E. Faulkner, Watertown, Wash.
 709,400.—ROD COUPLING—J. T. Fitzpatrick, Bakersfield, Cal.
 709,405.—WINDOW SCREEN—E. Hipolito, Los Angeles, Cal.
 709,153.—GATE—J. J. Hynding, Ferndale, Cal.
 709,321.—WOOD WASHING MACHINE—J. Keefe, S. F.
 709,333.—BED AND COFFIN—L. Krage, S. F.
 709,099.—BOTTLE—W. G. Lawrence, Oakland, Cal.
 709,338.—CAR COUPLING—W. S. Lennen, Tucson, Ariz.
 709,102.—WATER GATE—Martin & Ormand, Riverside, Cal.
 709,103.—MASSAGE MACHINE—C. E. Mason, S. F.
 709,104.—STAMP MILL MORTAR—W. A. Merralls, S. F.
 709,341.—GAS GENERATOR—C. W. Metcalf, Tucson, Ariz.
 709,236.—STATION INDICATOR—C. E. Morgan, Portland, Or.
 709,028.—PLOW—J. P. Mulroney, Plaza, Wash.
 709,370.—OIL BURNER—E. Stewart, Los Angeles, Cal.
 709,443.—OIL BURNER—W. H. Stewart, San Jose, Cal.
 709,248.—ELEVATING MACHINE—A. P. Tatterson, Stockton, Cal.
 709,428.—EXPLOSIVE ENGINE—F. B. Warring, San Jose, Cal.

SITUATIONS WANTED.

PHYSICIAN desires position with mining company. Good experience in hospital and general practice. Speaks German, Scandinavian, some French and Spanish. Anxious for advancement, but has no means. Address "Physician," care of this office, or 1327 S. Grand Ave., Los Angeles.

Cyanide Chemist, at present superintendent of cyanide mill, will be open for engagement after the 15th of October. Has been assayer of custom mill and mint. Ten years' practical experience of gold metallurgy in different countries. Address A. B. C., care Mining and Scientific Press, 606 Mack Block, Denver, Colo.

Have had eight years' experience as chief chemist and assayer for large copper smelting company; since then have been in charge of mines and smelting operations. Would like a position with some good, reliable company; can give the best of references. Address E. M. C., this office.

Cyanide and Stamp Mill Superintendent or Assistant Manager open for engagement after September 1st. Graduate. A thorough assayer and chemist; also accountant. Speaks Spanish. Will go anywhere. Specialty, construction; also successful treatment of low-grade and slimy ores. References "A. I." Address Practical, this office.

ASSAYER wishes to change position. Is also experienced amalgamator and miner. Would like to take charge of small plant. Speaks Spanish. "Aleman," Mining and Scientific Press.

Wanted, position by a first-class amalgamator and millman; also mining engineer and understands assaying; has had 15 years' practical experience in mining and milling; understands the erecting of milling machinery; best of references exchanged. Willing to go to any part of the country. Address Amalgamator, this office.

GOLD DREDGING.—Mining engineer with 8 years' practical experience in gold dredging is open for an engagement. X. Y. Z., care Mining and Scientific Press.

COMPETENT SUPERINTENDENT wants position in California; 15 years' experience in running mines, mills and smelters for profit, and managing men. College bred and technically educated. Formerly held positions as assayer, mining engineer, accountant, superintendent, and manager. Member A. I. M. E. High testimonials. Address "Superintendent," Box 813, Seattle, Wash.

WANTED.

Position as superintendent or assayer. Have had experience in mining, milling, cyaniding, smelting and putting up machinery and operating the above. Have a good assay outfit. Can sharpen tools. J. L. Wetmore, 1223 S. San Joaquin St., Stockton, Cal.

UNION IRON WORKS,

★ ★ 222 Market Street, San Francisco, Cal. ★ ★

Manufacturers of All Classes of MINING MACHINERY.

COPPER AND LEAD-SILVER SMELTING PLANTS,
 Latest Improved Water Jacket Furnaces,
 CONVERTERS AND ROASTING FURNACES,

Hoisting and Pumping Machinery,
 AIR COMPRESSORS,
 Stamp Mills and Concentrating Plants,
 HIGH GRADE ENGINES AND BOILERS.

WIRE ROPE AND TRAMWAYS

WRITE FOR ESTIMATES.

MANUFACTURED BY
Macomber & Whyte Rope Co.
 19 and 21 So. Canal St.
 CHICAGO, U. S. A.

MINING AND SCIENTIFIC PRESS

Whole No. 2202.—VOLUME LXXXV.
Number 14.

SAN FRANCISCO, CAL., SATURDAY, OCTOBER 4, 1902.

THREE DOLLARS PER ANNUM.
Single Copies, Ten Cents.

Value in Mining Literature.

The article on page 191 by an experienced Colorado miner on shaft sinking is the kind of thing that this paper takes particular pleasure in publishing, because it is just the sort of practical information of immediate value to any miner; it is useful, is what can not be found in any text-book or book of reference, and is what a good many want to know. It is illustrative of one phase of mining and scientific literature that appeals to all of us, viz., that while it is always easy to get descriptions of things, yet it is not always so easy to get clearly written accounts of

of knowledge there is a mutual advance, for "everybody is wiser than anybody," and sometimes the veteran can get a pointer from the tyro. Not the least of value in such an article is the immediate value to the man himself in writing it. For no matter how well a man may know the details of a subject, whether it be sinking a shaft, or constructing a ditch, or building a mill, or running a tunnel, yet, when he starts to write an article telling just how he did it, nine times out of ten he finds that he must marshal his facts and figures; must get data and set things down exact, and in the exactness lies the greatest measure of value to himself, and thus such

An occurrence unique in alleged cause is reported from a Portland, Or., machine shop, where three men were heating a small piston to shrink it onto a rod. While doing so it "exploded" with fatal result. Local accounts favor the theory that water seeped through 2 inches of solid cast iron, which under heat made steam pressure sufficient to rend the iron. The piston was 12 inches diameter and 12 inches long, the rod to fit through the center hole. It was an old piston and had been heated before. While it is locally asserted that there was no crack or fracture and no way for water to get in to be converted into steam, except by "absorption," such a



Hidden Treasure Vein No. 1, 600-Foot Level, Looking North, Portland Gold Mining Co., Cripple Creek District, Colorado. (See Page 187.)

how things are done, and it is just this latter that most interests the worker. There is always, of course, a certain amount of interest attached to illustrated accounts of big things, of great enterprises, but the reader, whether he be miner, millman, shift boss, or general manager, would be considerably more interested in the solution of some one of the little everyday problems that bother him in his work. That is why this paper so often urges miners and metallurgists to give of their store of experience, to give others the benefit of their knowledge and observation. There was a time that they didn't know and were glad to learn, and now that they have mastered many of the little details once so bothersome their light would be none the less for having lit that of their neighbors'.

The articles that tell how to do things, when written by the men who do them, are great help and of considerable encouragement to others not so experienced, and it often happens that in this interchange

an article is of value to him who writes it, as well as to those who read it.

The presentation and solution of ever-present problems that arise in daily work has long been our province and our privilege, and nothing is more welcome in the office of such a journal as this than a plain, clear story of how a thing is done, written by the man who has done it. He, probably, has done it so often and so well that it may appear trite, and even trivial, but its description may be as an inspiration to many others who long for just such information, and who are ready to respond with presentation of something else in which they have achieved a modest degree of success. There is a great deal of technical matter published, but that which is best and deserving of being preserved is what tells how things are done in the line of daily work, the "little" things as well as the big ones, for in this business, as in all others, it is trifles that make up perfection; and yet perfection is no trifle.

theory is not tenable, as only under inconceivable pressure could the most minute quantity of water permeate the pores of cast iron. It is more likely that when that piston was cast there was a minute flaw in the casting into which under pressure water percolated, oxidation closing the egress of steam upon heating, with disastrous result. The lesson is not to consider such an event as an "accident," for there is nothing accidental about it, but in such cases to make sure by drilling, if necessary, that no such predisposing cause for explosion exists.

It is a trite illustration to note metallurgical progress, but a notable case in point is afforded in Leadville, Colo., zinc ores. Formerly an ore in that locality had to carry 45% zinc before any of the plants would attempt treatment. There is now a good demand from there for ore carrying 30% zinc. Considerable such ore is now being shipped to zinc reduction works in Colorado, Kansas and Belgium.

MINING AND SCIENTIFIC PRESS.

ESTABLISHED 1860.

Published Every Saturday at 330 Market St., San Francisco, Cal.
TELEPHONE, DAVIS 771.

ANNUAL SUBSCRIPTION:

United States, Mexico and Canada.....\$3 00
All Other Countries in the Postal Union.....5 00

Entered at the San Francisco Postoffice as second-class mail matter.

Chicago Office (Telephone, Harrison 73).....737 Monadnock Block.
Denver Office (Telephone, Olive 733).....606 Mack Block.

J. F. HALLORAN.....Publisher.

San Francisco, October 4, 1902.

TABLE OF CONTENTS.

ILLUSTRATIONS.—Hidden Treasure Vein No. 1, 600-Foot Level, Looking North, Portland Gold Mining Co., Cripple Creek District, Colo., 184. System of Timbering, No. 2 Captain Vein, 400 Foot Level, No. 2 Shaft, Portland Gold Mining Co., Cripple Creek District, Colo., 185. Hidden Treasure Vein No. 2 Shaft, 600-Foot Level, Looking North, Portland Gold Mining Co., Cripple Creek District, Colo., 189. Captain Vein No. 7, 400-Foot Level, No. 2 Shaft, Portland Gold Mining Co., Cripple Creek District, Colo., 190. Hoisting Engine at Oliver Iron Co.'s Mine, Ely, Minn., 191. Mining and Metallurgical Patents, 192.

EDITORIAL.—Value in Mining Literature: A Unique Occurrence at Portland, Or.; Metallurgical Progress at Leadville, Colo., 184. The Fraudulent Grabbing of Mineral Lands; Success of High-Voltage Electrical Power Transmission; Electro-Metallurgy and Electro-Chemical Research; Montana Scheme to Develop Mining Property; Protection to American Manufacturers of Patented Articles; Midsummer Dream of Dwellers in the Hassayampas; Mistakes Not Irrevocable, 185.

LATEST MARKET REPORTS.—199.

MINING SUMMARY.—194-195-196-197.

MISCELLANEOUS.—Concentrates, 188. Timbering in a Colorado Gold Mine; Wet Reduction of Copper Ores; Tamping in Mine Blasting, 187. Stamp Mill Construction, 188. Mistakes of Miners, 190. Shaft Sinking; Painting a Steel Smokestack; Double-Drum Corlies Engine, 191. Mining and Metallurgical Patents, 192-193. The Gold Production of North America—Its Geological Derivation and Probable Future; Crocker-Wheeler Branch Office Managers' Convention; Specimens Wanted; Tunnel Under Bering Straits; Increase in Electrical Installation, 193. Personal; Commercial Paragraphs; Catalogues Received, 198. New Patents; Notices of Recent Patents, 199.

REGARDING the recent editorial remarks in connection with the morally fraudulent grabbing of mineral lands under the timber act of 1878, it is to be further specially noted that each such applicant for the purchase of such land must make oath that the land is chiefly valuable for the timber thereon. If it can be shown that the applicant swore falsely the Government of the United States can set aside the patent if issued, and restore the land to the public domain, to be again open to mineral location in accordance with the Statute of 1872.

THE notable success technically and commercially of high-voltage long-distance electrical power transmission on the Pacific coast has created the impression in some quarters that such power transmission is limitless. But there are indications that the latest California achievement in this direction is close to the limit. Ten years ago the transmission of 20,000 volts 100 miles was deemed an impossible idea. The Bay Counties Power Co. is now successfully transmitting 40,000 volts 182 miles. Recent experience appears to indicate that beyond 60,000 volts the resisting power of the air begins to break down and that atmospheric conduction and leakage ensue. The price of conducting material is another limiting factor in long-distance transmission. Insulation is the furthest advanced and the least liable to limitation. The most important part of it all is the matter of profit, for at the point at which such transmission ceases to be reasonably profitable marks the limit of such expansion as has been so remarkable a local feature of electric engineering in the last six years.

ELECTRO-METALLURGY AND ELECTRO-CHEMICAL research are so important a factor in mining and scientific progress that a national society is now in process of formation based on the same general lines as the American Institute of Electrical Engineers. The new move originated in Philadelphia, and so far about 400 have been interested in membership. It is characteristic that as soon as any branch of progressive work assumes a certain place and dignity in the scientific world that its practitioners associate themselves in voluntary organization for the common good. This is a distinct organization from the American Electro-Chemical Society, a new organization that is attracting to itself some of the brightest minds in that branch of mining and scientific progress. This society held its second meeting at Niagara Falls, N. Y., on September 15-18, with an

attendance of about 200. The society now has 418 members. Several technical papers were read and discussed, one on the closed, continuous type of electric furnace being deemed worthy of editorial mention. The author, E. R. Taylor of Penn Yan, N. Y., produced designs of an electric furnace of that type, being the result of practical and successful experience. It is intended for the manufacture of carbon bisulphide by the combination of carbon and sulphur at high temperature. A detailed technical description of the furnace would not be interesting to a majority of our readers, but the notable statement was made by the author that with less nerve on his part and less actual risk of failure than it required to build the furnace he was describing, he could construct a continuous electric furnace "that would dwarf the largest blast furnace in existence." His present furnaces are 16x40 feet.

A DILLON, MONTANA, concern advertises that its shareholders are to be assessed so much or so little per share to supply funds to develop a mining property on which an option is held. The company tacitly admits it owns no mining property or any other kind of property, but claims possession of value in the option and that it is right in assessing its stockholders for money to demonstrate just how much that option may be worth. While the thing cannot be commended as wholly regular, yet it seems to us that it is not fair to condemn it. There is something in the idea. If the company means business and honestly intends to develop the property on which it has an option and thus determine if it be worth buying; if it proposes to employ labor and pay its bills and do some mining in miners' fashion, it may in a measure justly ask its stockholders to pay assessments for such purposes. Still the corporation should be perfectly frank with its stockholders, tell them the exact facts; have them precisely understand that after they have paid their money they really own nothing tangible. In that way the company can avoid being afterwards charged with having obtained money under false pretenses.

AMERICAN manufacturers of patented articles can protect themselves against importations of infringements of such articles without taking the matter into court. Section 11 of the tariff act provides: "That no article of imported merchandise which shall copy or simulate the name or trade-mark of any domestic manufacture or manufacturer, or which shall bear a name or mark which is calculated to lead the public to believe that the article is manufactured in the United States, shall be admitted to entry at any Custom House of the United States. And in order to aid the officers of the Custom House in enforcing this prohibition, any domestic manufacturer who has adopted trade-marks may require his name and residence and a description of his trade-marks to be recorded in books which shall be kept for that purpose in the Department of the Treasury, under such regulations as the Secretary of the Treasury may prescribe, and may furnish to the Department facsimiles of such trade-marks; and thereupon the Secretary of the Treasury shall cause one or more copies of the same to be transmitted to each collector or other proper officer of the customs."

RECENTLY was noted herein as a passing fancy the midsummer dream of dwellers on the Hassayampa, Ariz., who proposed a mammoth cyaniding scheme, where the ordinary tank or vat would be ignored, as too trifling for contemplation, and the whole bed of the Hassayampa devoted to tank purposes by the emptying therein of six or eight carloads of potassium cyanide, after which nature would be left to take its course. As no glittering advertisement of the millions so easily made has so far been noted in Eastern papers, the scheme may not have materialized. But Baker City, Or., has evolved a plan formulating a \$10,000,000 company to cyanide the sands of the Snake. It seems, however satisfactory dredging and the homely burlap may be, the process of thus amassing wealth is too slow, and from advance prospectuses it is learned that great store of gold can be won by building "a gigantic dam, where all, or nearly all, of the water in the river may be taken out of the stream, cyanide added and again be sent on its journey over the gold-bearing bars in its bed. At a

proper point below the point of diversion another dam will be built to bedrock and the treasure-laden waters run through pipes to a level tract below, where they will be made to give up their treasures by means of the ordinary zinc precipitation tanks. The scheme is one of the most stupendous ever conceived, as tanks of requisite capacity would cover hundreds of acres of land, and the dams would necessarily be tremendous affairs." Well, rather! But the further statement is vouchsafed that "the possibility of saving all the gold contained in the bars of the Snake river, which are estimated by competent judges to contain from 10 to 15 cents per yard in infinitesimally small particles, makes the first cost of the plant pale into insignificance. It is estimated that the first year's run will net from \$35,000,000 to \$50,000,000." The most noticeable thing about these airy visions is that men who keep on saying such things get to believing them themselves after a while.

Mistakes Not Irrevocable.

A Colorado correspondent dissents from a statement or expression of opinion that appeared in the issue of the 23rd ult., in which was stated editorially that: "A mining engineer who has made a big mistake somehow, sometime, somewhere, and who has cost some company a big lot of money, is not always a man to shun in selecting competent mine management. It simply means that someone else has paid for his experience and it is not always likely that he will repeat the extensive and expensive mistake."

He thinks that a mining engineer who has made a big mistake should not receive any further countenance from any big employer; that the fact that he has made a mistake will predispose him to make other mistakes, and, accordingly, that he is of no further account to anybody, including himself. This is kind of hard. We are all liable to make mistakes, for infallibility is something denied to all mortals. Indeed, the writer believes that the man who never made a mistake never did anything else, good or bad, and that it is by our mistakes that some of the best things in this life are founded, namely, in being able to avoid them, in having the lesson so firmly impressed in one's mind that it will make him more cautious and less liable to a similar error of judgment. Defeat is part of our education, and one sometimes gains as much from a defeat as from a victory.

It is believed that our correspondent takes too hard a view and sets too lofty a standard for anyone, including himself. Any argument is worth just what it amounts to, when run to its logical conclusion, and if our correspondent's conclusions are correct it would close out all progress, all effort, and all possibility of advance in any line of human thought or action. It would shut the gates of hope and mercy, and set us all back away behind where we were in the stone age.

The idea implies, in general, that a mining engineer accepting a good salary, in a good position, ought to know it all, which appears absurd. No man knows it all, and when he takes a position, whatever he be paid, he cannot be paid for what he does not know, for if he or anyone else anywhere were paid for what he does not know there would not be money enough in the universe to pay any one man any salary in any position. What he is paid for is what he does know, and what he does know is subject to a great many contingent circumstances, and has to be tested by conditions as they arise, conditions often found new and perplexing.

This is not intended, nor is it to be interpreted, as an excuse, apology, or palliation of incompetence, but merely to illustrate the fact (for it is a fact) that most of us learn by either observation or experience. Fortunate, indeed, is the man who can learn wholly by observation alone—who can note and avoid the mistakes of others without making a mistake himself; but still it is probably the fact in nearly every case that the lessons one learns by experience are vastly more valuable to him than anything he can possibly learn by mere observance of others' shortcomings. The whole thing is a question of ethics, that need hardly be entered into at length, the idea of the paragraph which elicited our correspondent's dissent being one that has been almost universally accepted in every line of work since work began, and as true as trite.

Concentrates.

THE freight on mining machinery from Chicago, Ill., to Baker City, Or., is \$1.32 per 100 pounds.

THE output of silver in the United States for the year ending June 30, 1902, was, approximately, 64,000,000 ounces.

CALCIUM CARBIDE costs \$3.75 per 100 pounds, or \$70 per ton in ton lots at distributing points east of the Missouri river.

IN the Mercur district, Utah, at the Chloride Point mine, gold has been produced at a cost of \$8 per ounce and silver at a cost of 23 cents per ounce.

SINCE 1853 \$1000 coined in standard silver dollars minted at the U. S. mint weigh 859.375 ounces, and the same amount in halves, quarters and dimes, 803.75 ounces.

OF equal weights, wood has two-fifths the evaporative power of coal in making steam—it will do less than one-half coal's work. Oil is more economical than either under general conditions.

IRON may be quickly and easily cleaned of rust by dipping in or washing with nitric acid, one part; muriatic acid, one part; water, twelve parts. After using, wash with clean water.

THE Land Department considers each individual placer location a separate mining claim in application for a U. S. patent, and upon each is required \$500 in work or improvements. One application will do for contiguous or adjoining claims.

AS to selective action in the cyanide process when copper is present, cyanide of potassium has an affinity for the copper, not for the gold; in case of excess of the solvent, the excess will operate against the base metals and be quiescent as to the gold.

THE magnetic poles are the points to which the magnetic meridians, as determined by the directions of the compass needle, converge. The one in the northern hemisphere is located 70.5° N., 97° W. The south magnetic pole has never been reached, but is believed to be not far from 73° S., 150° E.

WHEN the right to a patent to a mining claim has been fully acquired the equitable title in the purchase is complete and there is no obligation to make further expenditure in labor or improvements on the claim under Sec. 2324 of the Revised Statutes, and no adverse interest can thereafter be acquired by re-location or otherwise.

ZINC PRODUCTION is growing at a faster rate than copper production. The 1891 zinc production of the world was 404,320 tons; of 1901, 582,400 tons. The American production was 87,360 and 179,200 tons, respectively. The world is beginning to depend on the United States for zinc. Last year this country exported 23,000 tons of zinc.

POTASSIUM PERMANGANATE can be used in treating gold-copper ores. The finely crushed ore is ground with chloride of sodium and sulphuric acid and the permanganate added to the mixture. Hydrochloric acid is formed at first, which with the permanganate yields chlorine, which at the moment of its liberation dissolves the gold.

A GOOD cement for leather beiting is made by working together ten parts of bisulphide of carbon, one part oil of turpentine with gutta percha, forming a thick paste. The leather where the cement is to go should be unrolled and roughed, and when the cement is put on the ends should be pressed together closely till the cement has well dried.

THE failure of any applicant for the patent to a mining claim to prosecute his application to completion, by filing the necessary proofs and making payment for the land, within a reasonable time after the expiration of the period of publication of notice of the application, or after the termination of adverse proceedings in courts, constitutes a waiver by the applicant of all rights obtained by the earlier proceedings upon the application.

THE annual expenditure of \$100 in labor or improvements on a mining claim, required by Sec. 2324 of the Revised Statutes, is solely a matter between rival or adverse claimants to the same mineral land, and goes only to the right of possession, the determination of which is committed exclusively to the courts. It is a matter with which the land department has nothing to do, and hence can make no determination with respect to it.

MOLYBDENITE, the ore from which molybdenum is produced, is a soft, scaly, foliated mineral of glossy lead color, and is the sulphide form in which molybdenum occurs. It is largely distributed through granite, gneiss and limestone formations. In appearance the metal has a silvery look, somewhat resembling high-grade graphite, but from which it can be distinguished by its streak. Its existence in surface veins is indicated by the brilliant saffron color of the oxidized metal.

FOR $\frac{3}{4}$ in. and $\frac{1}{2}$ in. rivets, pressures of 60 to 70 tons are required on the rivets, the work done being about 7200-foot pounds for $\frac{3}{4}$ in. rivets and 9500-foot pounds for $\frac{1}{2}$ in. rivets. These figures refer to bridge work; in boiler work, where rivets are shorter and the holes usually better finished, less power is needed and the pressures required are about as follows: For $\frac{3}{8}$ in. rivets, 25 tons; for 1 in. rivets, 66 tons; and for $1\frac{1}{4}$ in. rivets, 100 tons. For cold flanging of $\frac{1}{2}$ in. steel plates a pressure of 600 pounds to 740 pounds is needed per running inch, with 5-16 in.

plates, 710 pounds to 750 pounds pressure per running inch for $\frac{1}{2}$ in. plates, and 380 pounds for $\frac{1}{4}$ in. plates, though much will depend upon the heat of the plate. For cold riveting, pressures of 300,000 pounds per square inch are needed.

THE reason why mercury is used in thermometers is because of all liquids it most nearly fills the conditions of returning accurately to the same volume upon being brought to its initial temperature, and of admitting a considerable change of temperature without a change of state. Moreover, it is easily obtained, is very opaque, and hence easily seen, and does not cling to the glass. Alcohol and ether are occasionally employed for moderate and for low temperatures where mercury freezes.

FINELY powdered graphite, when introduced into the cylinders of either steam or gas automobiles, assists the oil which is usually employed for the purpose of lubrication. Vegetable or animal oil should be used sparingly, if at all, for the lubrication of engine cylinders. Even the best mineral oil in the cylinders of gas engines chars under very high heat, due to the combustion of gases. The heat in a gas engine cylinder is from 1200° to 2000° F. Special graphite lubricants are prepared for the gears of both electric, steam and gas motors.

THE Idaho grubstake law provides that "written contracts relating to prospecting or mining or to the formation of copartnership for that purpose, when signed by the parties thereto and indorsed by at least one witness, may be recorded in the office of the county recorder of the county wherein it is proposed to prosecute the business of said copartnership or where the property affected by such contract is situated. Such record shall be constructive notice to all persons of the matters contained in such contract or copartnership agreement."

THE value of chrome ore depends upon its percentage of chromic oxide, Cr_2O_3 . The standard ore contains 50% of Cr_2O_3 , and for every unit above 50 there is an increase in value per ton of 75 cents to \$1; but below 50% there is a much greater reduction per ton. Ores that are low in silica are more valuable, and even when they are as low as 45% of Cr_2O_3 they find a ready market if they are very low in silica. Chrome ore has been produced in commercial quantities in California, Maryland and Pennsylvania, but can be imported cheaper from Turkey than it can be mined in the United States under present conditions.

IN assaying zinc precipitates by a method in which nitric acid is replaced by sulphuric acid, 1.10 A. T. of precipitate is heated with 20 c.c. conc. sulphuric acid and 60 c.c. water. This is boiled for one hour, cooled, distilled to 100 c.c., 75 c.c. mineral salt solution and 20 c.c. of lead acetate solution added, the precipitate allowed to settle for one hour, then filtered, washed and dried, care being taken to wash the precipitate into the point of the filter. The paper is burned off at a very low heat, the residue scorified until half covered over in the scorifier, then poured, and the button cupelled, thirty to forty grams of lead being used.

SUPERHEATERS are generally placed behind the boilers, in the flue leading to the chimney, although when the space is too contracted to permit of this arrangement a chamber may be constructed above the boiler. Care should be taken to permit the superheater tubes to be well drained, as otherwise water is apt to collect in the lower portion, and, in spite of the heat, it remains difficult to dislodge, since in most instances there is no provision for water circulation. The space taken up by the water diminishes the capacity of the superheater, and the water is apt to be carried over suddenly to the engines, with disastrous results.

AN application for a U. S. patent for a mining claim must be accompanied by an affidavit that \$500 worth of work or improvement has been expended thereon. Where there is a group of contiguous or adjoining claims and patents are wanted for them, if it can be satisfactorily shown that the work done on any one of them went to improve or develop the entire group, it would be admissible—provided that the affidavit shows that on such one claim the work or improvement was as many times \$500 as there are claims in the group on which patent is desired. That is, supposing the application is for four claims, then an aggregate of \$2000 in work or improvement must be shown to have been expended. The \$2000 can have been put entirely on any one of the four if it can be shown that such expenditure tended to improve or develop all four.

THE air used between the cylinders of a compound pump can be interheated by inserting an ordinary feed water heater into the suction or discharge line through which the water is pumped, the cold exhaust air passing through this heater on its way to the low pressure cylinders in the same manner as boiler feed water. Exhaust air is often several degrees below zero, and as compared with that temperature, mine water at 60° is effective as a means of heating. Under this system there is no freezing and the air consumption is cut in two. This may be carried into triple or quadruple expansion for large plants of heavy duty. A hoisting engine can be arranged for reheating very readily, but in all cases the heater must be placed as close as possible to the cylinders using the air. The heater should be carefully covered with magnesia and all hot pipe connections and cylinders using the air fully protected. The usual reheating temperature does not exceed 350°, a temperature that gives no trouble with lubrication, stuffing boxes, etc. The usual rule is not to heat to a point higher than will result in the exhaust being at mine tempera-

ture, thus in no way interfering with comfort or ventilation. The exhaust of a rock drill on a hot day may be below zero, though the air be used full stroke and without expansion; but with the air heated to a point which results in an exhaust temperature about equal to the atmosphere that 95% efficiency may be secured. With a small amount of heat the results are often six times more important than results from the same amount of fuel burned in a boiler furnace.

TO BE ABLE to calculate the value of a mining property, as one would calculate the ground to be moved on a railroad, is rarely possible. No law which can have general application exists. Every case must be judged individually, for no two cases are any nearer alike than two men. Formulae for mine examinations and estimates are pretty and read nice, but are not satisfactory in practice. Ore in sight is always an indefinite quantity when measured in net value. While tonnage may be estimated in many cases accurately, values are not so easily arrived at. There are commercial risks in mining which cannot be measured with mathematical accuracy, any more than they can in manufacturing. Labor cost may change, strikes may come, freight and smelter charges may alter; copper, silver and lead prices vary; supplies fluctuate in price; floods and fires and cares may come; and all these things are commercial risks. Then there are few ore deposits so regular that anything more than an approximate estimate can be made of their tonnage. When it comes to values, they are so changeable that what they will be out of sight is only a guess. Geographically, one may say that the chances are an ore body will continue. But no one can accurately say what its value will be.

IN the Red Jacket drift mine, Placer county, Cal., the gold is found in the channel of an obliterated river, now covered with volcanic filling to a depth of several thousand feet, but still at the top of a mountain. It is reached by a horizontal drift 1700 feet long. The drainage water is made to drive a water wheel and blower for ventilation purposes, and farther in its flow downward to drive another compressor, which furnishes the power for the operation of the mine, including an air compressor locomotive. Compressed air was adopted for the haulage system in preference to an electric traction system, owing to the irregularity of the tunnel and to the fact that there is no timbering in the mine, the volcanic roof of the tunnel being as hard and strong as cement. Consequently there were no convenient points for the attachment of insulators. The locomotive can take sixteen to eighteen empty cars into the mine at a speed of about 9 miles an hour. The loaded cars are taken out by gravity. The face of the working is over $3\frac{1}{2}$ miles from the entrance to the tunnel. This is a typical drift mine, representing in its operation the perfections, detail and economy of cost that experience in this kind of mining has suggested. Its original location was by purely theoretical deduction.

SUBSCRIBERS to a live, progressive technical journal might consider themselves a vast fraternal organization, whose business it should be to help each other. The man who learns how to do any work easier than he has been in the habit of doing it can lose nothing by describing the operation for the benefit of his brother miners or metallurgists who are subscribers, for the man who gives something of his own knowledge is sure to get back in return something of the knowledge of others, and in the long run all are benefited. The man who has read this paper for a year or longer will find his intellectual range broadened. He no longer considers himself one of a small community, but rather one of a large community, extending practically all over the world, because the readers of this paper can be found in nearly every civilized country on the globe. The miner in Oregon finds himself in touch with the miner in Australia or South Africa. There was a time, years ago, when experienced miners tried to keep their knowledge to themselves, under the impression that what they had spent years in learning ought not to be given away. In the early days of the publication of this paper this was a strong feeling in many places, but that is nearly all gone. The man who thought he knew how to do work better than anybody else discovered after a while that others knew as much as he did.

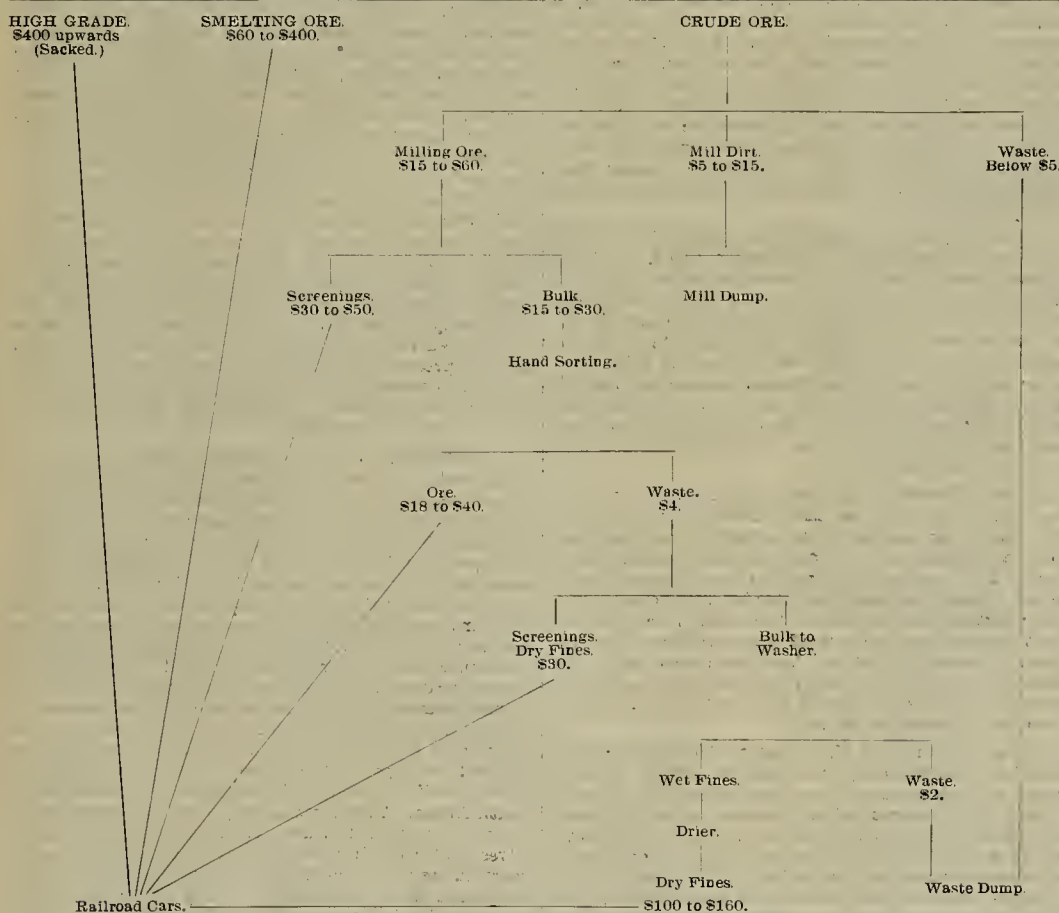
THE most recent improvements in the manufacture of sulphuric acid comprise a process used in Germany, being the substitution of cast iron recipients for concentrating the acid for those constructed of platinum. The high price of the latter metal has led the manufacturers to look for a substitute, and it has been found that the cast iron recipients answer very well in cases where it is not necessary to have an acid absolutely free from iron. The iron should be free from impurities and as hard as possible. In the process used the acid is first concentrated in lead recipients to 61° B, then introduced into the cast iron vessels, where it is further concentrated to 64°. It finally passes into two other concentrators, where it reaches 97° to 98° B. The smaller recipients last three or four months and the large concentrators from six months to one year, the loss being less than that of platinum and the cost comparatively small. Another process has been devised in England, in which the lead chambers are entirely suppressed, and nitrous vapors are used as an oxydant, the process resembling that which is now used for producing nordhausen, or fuming sulphuric acid. The process is advantageous in the production of concentrated acid directly, thus doing away with the concentrating process. It gives an acid which is pure and free from arsenic.

Timbering in a Colorado Gold Mine.

In the issue of Sept. 20 appeared an exhaustive article, with illustrations drawn to scale and especially engraved for this paper, the title being "Mine Timbering by the Square Set System at Rossland, B. C." The article was written by Bernard MacDonald, manager of the Le Roi mine, Rossland, B. C., and went into the subject in minutest detail of operation and costs, including the excavation of the ore.

In this connection it has been thought of further interest to portray the manner of timbering in a great mine in an entirely different region, and under entirely different circumstances, viz., the Portland gold mine, Cripple Creek district, Colorado. The three engravings on pages 188, 189 and 190 tell their own story, needing little of written explanation to the practical miner. The engraving on page 189 is merely given place to illustrate the fact that in this, as in other extensive mines, there are parts of the underground workings where timbering is unnecessary. At the time the flashlight photo was taken from which was engraved the picture on page 184, Hidden Treasure vein on that level—the 600—had developed an ore shoot 200 feet long, with an average width of 3½ feet. On the same vein in No. 2 shaft, on that level—the 600—as shown on page 184, was developed an ore shoot 205 feet long and 5 feet wide. Almost precisely similar ore development was made on the Captain vein on the 400-foot level, as shown on pages 188 and 190.

Regarding the handling of ore at the Portland mine, the accompanying diagram gives graphic representation of the system now in use there and the manner of handling the various products of the mine:



The diagram is self-explanatory. The crude ore as broken in mass by the large machine drills yields from the stopes in general two products, ore and waste, the waste not being absolutely valueless, but including all material that runs less than \$5 per ton. The proportion between ore and waste varies considerably in the different veins. In most of the stopes the product is ore and mill dirt—no waste.

A saving of values has been effected by passing the ore house waste from No. 2 shaft through a washing apparatus, which saves 50% of the assay values at small cost. This apparatus consists of an iron plate perforated with holes ½ inch diameter, set on an incline, on the upper surface of which numerous jets of water play in various directions. The ore house waste as dropped into a bin by the ore sorters passes over a screen, which takes out the dry fines at the daily rate of one ton of 1½-ounce ore. The hulk of the waste continues downward over the perforated plate, where the water jets wash off all the fines still adhering to the rock. This is collected and dried on a large, flat, hollow sheet iron box, heated by exhaust steam from the hoisting engine. This product yields one and one-half tons of ore running from 5 to 8 ounces per ton in every four shifts of eight hours each. The washer is only run eight hours per day—the day shift—and is tended by two men only, who were formerly fully occupied by tramping the waste

from the ore house. The water used is a small amount, circulating continually through a small boiler feed pump, run by exhaust steam from the hoisting engine. The final waste to the dump averages \$2 per ton, while the waste from the No. 2 ore house runs \$4 per ton.*

All big mines have their problems. Timbering and ore handling have been successfully settled. The question of handling the water is in a fair way to be. During 1901 there were pumped from the mine 147,912,898 gallons of water. They have had to handle 19,000,000 gallons of water in one month, but now have a pumping plant of sufficient capacity to take care of that quantity, permitting continuous ore extraction. The main working shaft is now near the 1200-foot level. The compressor plant is capable of driving fifty drills at an altitude of 10,000 feet. A tunnel 3 miles in length, jointly with the Gold Coin Co., passing through Straub mountain, under the city of Victor, entering at the 1400 level, would effectually solve the water problem. The only other problem of the company is to get rid of the excessive tax of \$53,000 per annum, imposed by the grangers of Iowa, the company being an Iowa incorporation. That, however, should be easy of avoidance or solution by dissolving the Iowa incorporation and reincorporating in some one of the other forty-four States.

Plans are now being drawn for the remodeling of the Burns shaft; among other things, is a belt conveyor for handling the ore. The ore on reaching the surface will be dumped over grizzlies, the coarse rock going through a crusher. The coarse rock coming from the crusher will be shot into a washing machine and from there falls on the belt conveyor. Ore sorters will take the ore off the conveyor; the waste rock

Wet Reduction of Copper Ores.

This method of obtaining copper is employed mainly with ores which are too low in grade to be worked profitably by roasting and smelting. It can be used under favorable circumstances with ores which contain as low as one-half of 1% to 1% of copper, and also for reducing the cupriferous slack which remains from the production of other metals. It consists in precipitating the copper from a vitriol or chloride solution by means of scrap iron or other reagent.

The solvents principally used for this purpose in Germany are diluted sulphuric and muriatic acids. As the former is largely produced by the dry process of reducing copper, sulphuric acid is usually cheapest in the neighborhood of copper mines, and hence vitriol solutions are generally used for the wet process in that country. Muriatic acid produces a chloride solution, and in the neighborhood of works which manufacture soda from common salt by the Leblanc process it is often sufficiently cheap and plentiful to be economically used for leaching copper ores and concentrates. In order to be worked by the wet process, ores should contain copper in the form of either oxides, sulphates or sulphurets, and upon all such minerals, including lasur and malachite, both these acids act with great energy. A special form of the wet process, known from its inventor as the "Dotsch method," is practiced in Spain, and to some extent in Germany with imported Rio Tinto ores, which contain copper and iron pyrites in combination with other metals and impurities. In this process the ore is leached with a chloride of iron solution, which takes up the copper, which, being immersed for a certain period, replaces the copper, leaving the iron pyrites practically intact. The copper is then precipitated from the charged solution with old iron, which, being immersed for a certain period, replaces the copper, which falls as a precipitate, and is then dried, smelted, and refined in the same manner as crude copper (Kupferstein) in the dry process. The two reactions which take place successively in leaching the ore and precipitating the copper from the solution thus obtained are stated in chemical formulas as follows:

1. $\text{CuS} + \text{Fe}_2\text{Cl}_6 = 2\text{FeCl}_2 + \text{CuCl}_2 + \text{S}$.
2. $\text{Cu}_2\text{S} + \text{Fe}_2\text{Cl}_6 = 2\text{FeCl}_2 + \text{CuCl}_2 + \text{S}$.

The tanks and other apparatus used for the wet process are made either of masonry or of wood which has been holed in asphalt pitch and then lined with lead. The leaching tanks have false or grated bottoms made of firebrick or hasalt. The leaching solution is pumped up repeatedly through lead pipes and poured over the top of the ore, whence it percolates downward through the mass, eating out at each passage more and more of the copper until at the end of eight or ten days it is saturated with metal and passes to the precipitating tank, where, after settling, the copper is released by the action of iron as above described, and the spent solution then regenerated and returned to perform the same service over again. By this process it is possible to leach out copper from ores down to one-fourth of 1% of the metal contained. Ores which contain lime cannot be worked with muriatic solution, as the acid attacks the alkali before taking up the copper. When a chloride of iron solution is used in the wet process, it may be cheaply made by dissolving 120 parts of common salt in 1000 parts of water and adding 280 parts of sulphate of iron (green vitriol). Crystals of sulphate of soda are formed, but these are removed by straining and the solution is then ready for use.

The proportion of iron required to precipitate copper from either of these solutions varies with certain peculiarities of the saturated solution itself, resulting from special characteristics of the ore under treatment. In theory 88.8 pounds of iron should be sufficient to precipitate 100 pounds of copper from a chloride solution of copper-sulphate ore. The more salts-of-iron oxide there is present in the lye—as often happens in treating ores heavily impregnated with iron—the more iron will be required to precipitate the copper, and the proportion may be as high as two to three pounds of iron for each pound of copper. The generation of these basic salts in the lye is one of the disadvantages of the wet process, since it not only increases the requirements of iron, but endangers the purity of the copper precipitate. This product is then washed to eliminate as much as possible of the salts of iron, graphite, silicic acid, antimony, arsenic and other impurities, after which it passes to the refining stage of the process.

The refining of cement copper, which is the technical name for the precipitate obtained by the foregoing wet process, is accomplished as follows:

If, after washing, the precipitate remains charged with impurities, it is smelted in a puddling furnace (Flammoeofen) into raw copper, and then purified. If it is reasonably pure after washing it goes direct to the refinery as cement copper, where it is treated in the same manner as the raw copper obtained by the usual German process of roasting and smelting.

L. DE LOBEL furnishes suggested details of a plan for a through line from Paris to New York via a tunnel under Bering straits; total length of lines, 14,670 miles, of which 6000 miles would have to be constructed. His plan is for a tunnel under the straits, distance 37 miles; two islands in the straits are utilized for air shafts and, possibly, stations.

will be permitted to remain on the belt, which rejects the waste way out on the dump. It is designed to make a saving in the cost of handling the mine product. The collar of the Burns shaft will be raised 30 feet.

*From the company's last annual report.

Tamping in Mine Blasting.

TO THE EDITOR:—Upon reading the "Concentrate" in the issue of Sept. 6 about tamping, the following suggested itself to me: To use from one-half to one stick of giant powder at tamping in mine blasting—according to liability of one blast shooting fuse out of another hole—for upper or any other kind of hole, would mean a great saving in time—wasted in tamping and looking for proper tamping by miners—to mine owners, and would decrease the number of accidents to miners, not to mention the powder headaches that would be avoided by handling powder longer than necessary. Impartial practical tests will show that the "tendency of giant" is not "down and out or down and up," but in all directions the same. If this is so, tamping for any other purpose but to hold the fuse in hole, even if as solid and compact as the rock drilled in, would be worthless in 999 out of every 1000 holes drilled in mines.

Chloride, Ariz.

C. KYLE SMITH.

Stamp Mill Construction.*

J. J. DEMING, Boise, Idaho.

The common operations or construction of a stamp mill do not necessarily involve a fine knowledge of chemical formulas or complicated mechanics. A good millwright or millman has that common sense which is the basis of all true science, and has won a knowledge of the true bedrock principles of stamp mill construction by close observation and experience, which no book knowledge can give him; always remembering never to use a new device or make a change without a reason for it, and that where there have been so many great improvements in the past, there is still room for more in the future, for no stamp mill has ever yet been built that was perfect in every detail.

One of the great axioms of successful stamp mill construction is to adapt the construction of the mill and reduction process to the character of the ore to be treated. This in a measure accounts for so many variations in stamp mill construction.

The most truly scientific method in the reduction

make a higher percentage of extraction from these pyritic ores is evidence that their system of mill construction and milling is second to none. If this be true, it is due to the proper recognition of the necessity for changing the modes of treatment and mill construction to conform to the different characters of the ores. These changes did not take place in a day, but are the outgrowth of years of hard work and observation. The mill men of Colorado have been trained in the best of schools, that of experience.

The mine owner should not consider the work finished when the ore is hoisted to the collar of the shaft, but on the contrary, the mill demands the greater experience and attention, and no management can be too careful in placing competent men in charge of the plant.

In the construction of the mill building there are three important factors to be observed: light, heat and room. Nearly all of our large mills are dark in the middle; none should be that way; builders depend too much upon side-wall windows for light. If the mill is not built in elevated sections, so that each department can have its own system of lighting, it is

true that natural rock foundation is better for any machinery, yet it cannot always be secured, and a better rule would be to locate the mill in the most convenient place with reference to the mine and other surrounding conditions, and if there is no rock foundation construct one. This may be a violation of all rules of battery foundation, but like many other rules there must sometimes be exceptions. If a natural foundation cannot be secured, make an excavation deep enough so that the bottom is of a homogeneous character. A foundation partly on rock and partly on sand can never last. A space of 72 square feet, or about 6x12 feet, will be large enough for a 10-stamp battery. On the bottom of this excavation build a cement concrete 3 feet high, using about three parts sand, three parts of broken rubble, and three parts of Portland cement; a coping of about 2 inches on this concrete, consisting of equal parts of sharp sand and cement will give a smooth level surface. After this concrete foundation has thoroughly set, it is ready for either an iron or wood mortar block. In a like manner concrete piers can be built for the mud sills and battery posts. Anchor bolts



System of Timbering, No. 2 Captain Vein, 400-Foot Level, No. 2 Shaft, Portland Gold Mining Co., Cripple Creek District, Colorado. (See Page 187.)

of any ore is certainly the most sensible, and it is one of the duties of every mill constructor or mill man to determine what are the exact conditions required, and then arrange his mill to them. If a stamp mill is to be the process employed in the treatment or reduction of a particular kind of ore, the first consideration in constructing that mill should be the arrangement and design of the process best suited to saving the values in the ore. It is the adaptability of the stamp mill to the ores of a great diversity of character which enables it to hold its own in the wake of the evercoming new devices continually offered by the inventive genius of this generation. It is this distinctive feature of combination that enables the stamp mill to compete successfully, for it is a crushing, amalgamation, reducing and extracting device combined, and despite these new inventions, with the encroachments of the smelter on one side, and the leaching process on the other, the stamp mill still continues to be the simplest and best way of extracting the hidden gold yet invented by the ingenuity of man. It is probably true that the ores of Gilpin county, Colorado, contain a higher percentage of sulphuret than any other gold-bearing mill ore treated by amalgamation at any of the chief milling centers of the world to-day. The fact that they

better to place skylights in the roof, for one skylight will give more light than four windows in the wall of the building. Whitewashed walls and ceilings will aid in producing better light. The amalgamation and concentration departments should be warm in winter. It is best to build this part of the building double board with building paper between the battens on the outside. If the mill has steam power, a very good system of heating can be arranged from the exhaust steam from the engine. If the mill is not equipped with steam power, a good stove or two with large hot-air drums will prove economical of fuel and keep a 30-stamp mill sufficiently warm for operations. Avoid cold drafts of air, for icicles, plate amalgamation and concentration will not work together.

In the matter of room or space, no millwright should try to economize in this particular. Have plenty of elevations between the different departments of the mill, plenty of room around the batteries and the concentrating machines. These three factors, light, heat and space, are not luxuries; they are necessities in every well regulated mill.

Next, we come to the battery foundation. Nearly all stamp mill constructors seem to think that the mortar blocks should be set on solid rock, or rather that mill sites must be chosen with reference to the foundation for the mortars. While it is probably

should be built in the concrete work for holding the mud sills and mortar blocks.

The back knee frame, while it has some objections, is considered best for a battery frame; it gives a solid support to the ore bins, and the pull of the belt to the cam shaft is downward. However, there seems to be a considerable difference of opinion among mill men as to just where the driving shaft should be placed; many insist that the shafting be placed on the battery sills, while others maintain that it is better to place this shaft on an approximate level with the cam shaft. This last arrangement has two or three advantages over the first. There is less vibration at this point than on the battery sills, less dust and dirt; and the use of the belt tightener is not required. The life of the belt in this position is much longer, as has been demonstrated in the mills of South Dakota, where the two arrangements have been used.

The iron battery frame has gradually come into use in Australia; this has added much to the appearance of the stamp mill, but the question is often asked, Does not the iron frame increase the vibration produced by the fall of the stamp? It is generally supposed that the wood frame takes up this vibration better than iron and prevents a crystallization of the iron work of the battery. This question is often a matter of controversy between mill men, but the experience

* Condensed from paper read before the Mining Congress at the fourth session.

of the Australian mill man does not sustain the idea of crystallization, for many of the iron-frame batteries in that region have been running for years without any serious results. The design of the mortar, which is seldom ever left to the millwright or the amalgamator, becomes an interesting question, for the character of the ore may require that the mortar be made an amalgamating machine as well as a crushing; in that case the mortar should be built wide and deep, after the fashion of the Colorado or Black Hawk mortar, which gives room for both back and front inside plates. On the other hand, the ore may be of such a class that inside amalgamation cannot be effected. Notable among this class are the milling ores of Custer county, Idaho. Every attempt at inside amalgamation of these ores has reduced the percentage of extraction. From this experience, the mill men of that district have learned to design their mortar as a crushing machine; narrow, with a shallow discharge. Again, we may bridge between these two extremes and design a mortar with a chock block and front plate only. This modification is to be recommended when both back and front plates cannot be used, for the sooner we catch our gold, the less chance there is to lose it. If it can be recovered in the mortar, it is better not to let it pass out in order to catch it on the outside. Finally, these different modifications become a business proposition to be carefully weighed by the mill manager, as to whether the increased extraction inside the mortar will make up for the loss in tonnage by inside amalgamation.

The depth of discharge, or the distance from the level of the issue to the top of the die is a very important factor, the importance of which is usually underestimated. In the deep discharge mills of Colorado, the distance from the top of the dies to issue is from 14 to 16 inches, while in many other milling centers the discharge is less than 2 inches. These varying conditions usually come from arranging the mortar to suit the requirements of the ore. In any case the discharge should be kept as constant as possible. It is better to put more metal in the stem and less in the bosshead. With a light steel tappet there is less vibration in the stem and consequently longer life. With a steel tappet and the end of the cam chilled, there will be less friction and little wearing of cams.

Shoes and dies should not be the same hardness; better have the shoes of steel, and the dies of cast iron.

Tables for the apron plates should be made heavy and solid and of the best material; usually 3x5-inch pieces, spiked together and dressed to an even surface on the top side, $\frac{1}{4}$ inch lower in the center, with a side rail on either side $1\frac{1}{2}$ x20 inches. This will make a solid bed for the plates. If the tables are long, 12 or 16 feet, it is better to divide them into two sections of 6 or 8 feet each, with a drop of 2 inches between the two. The pitch of the tables is another question that mill men do not always agree upon. The tendency in later years is to give the plates more pitch. The pulp in this case requires less water and gives it more of a rolling motion; a 2 or 2 $\frac{1}{4}$ -inch grade seems to give the best results.

The weight of the stamp varies from 500 pounds to the heavy stamp of 1250 pounds or more; only the prospecting mills have lighter weight. The most desirable weight for a given ore depends much more than is usually supposed upon the required conditions favorable to amalgamation. The light stamp of Colorado is an outgrowth of one of these conditions; while on the other extreme, the heavy quick drop of California is desirable on account of its great crushing capacity. A series of experiments carried out by the Alaska-Treadwell Co., among others, demonstrated that a stamp heavier than 1000 pounds was a good pulverizer, but not a good amalgamator. Likewise the same conditions have been found to prevail with the heavier steam stamp on gold ores of the Black Hills. The arrangement in the order of drops of the stamps in a battery must be arranged according to the work required. For rapid crushing, the order 1, 5, 2, 4 and 3 will work well, while for the long, slow drop of the Colorado mill, the order 1, 5, 3, 2 and 4 will give an even distribution of ore in the battery. The order 1, 4, 2, 5 and 3 for heavy stamps and inside plate amalgamation will give good results. The order 5, 1, 3, 4 and 2, commonly used in Australia, is a very good system, but the order of drop is more a fancy of the mill man, rarely any two men using the same drop.

We find in general stamp-mill practice these three classes of plates in use—the plain copper, the silver-plated copper, and the Mutz metal, a composition plate 60% copper and 40% zinc. While the plain copper is used in many mills, it is not to be recommended in any instance, and although its first cost is less, it will not compare with the many advantages that the heavy silver-plated plate has over it. While it is true that in time the silver plating will wear off and expose the copper, and in that case lose some of its

efficiency, it still can be plated again, for no large stamp is complete without a plating arrangement. Again, an old plate will always buy a new plated one. The Mutz metal plate used in Australia is in some instances superior to the silver-plated copper; its absorbing power for mercury is limited, and it is more easily cleaned up than either of the other plates, which makes it better for test runs or custom mills. When the ores contain compounds of other elements, which will cut up the mercury, the composition plate is preferable.

Again, it is said that the zinc in Mutz plates sets up a kind of galvanic action which has a tendency to purify quicksilver. The verdigris, so annoying to the mill man, never comes on the composition plate, but for all conditions, the silver-plated plates are superior to all others. The sluice plates should be made at least as wide as the plates above, instead of

from banking on the plates. Warming the water for amalgamation and concentration in winter is a point to which too little attention is given. This can be accomplished where steam power is used by passing the exhaust steam through a coil of pipe into the water tank. The water should be kept at an even temperature, never exceeding 70°; frequently a lower temperature will do better work. The water tank should be so arranged as to give a constant pressure at the batteries, hydraulic sizers, and concentrators.

Every stamp mill, no matter how small, should be equipped with sizing bars, rock breakers, and automatic feeders; better to have two rock breakers, one for the coarse and a smaller one for the fine ore. Uneven ore sizing and irregular feeding add very much to the wear and tear of the stamp mill. Do not try to make a rock breaker out of your mortar. If it pulverizes and amalgamates your ore, that is all



Hidden Treasure Vein, No. 2 Shaft, 600-Foot Level, Looking North, Portland G. M. Co., Cripple Creek District, Colo. (See Page 187.)

narrower, which is the common practice. The same amount of pulp and water must necessarily pass over them as the upper plates, and the gold expected to be caught by the sluice plate and more difficult to catch than that which has been caught on the plate above; but the reverse of this is generally the case. In most mills the sluice plates are much narrower, sometimes only 20 inches wide, and set at a greater angle, and the little gold caught is more by accident than by reason of design.

It occurs to me that they are excellently devised for carrying off the mercury, the gold and everything else, rather than arresting what has already passed the tables above. The quantity of water used is usually about 750 gallons per ton of ore crushed; this amount is sometimes varied to suit the specific gravity of the pulps, the intention being to regulate this factor so as to produce a slow, wave-like motion as the pulp passes down over the tables, using sufficient water to prevent the heavy particles of ore

that is required. It has been thoroughly demonstrated that the rock breaker is a great saver of mortars, shoes, dies, bossheads, screens, etc. The time lost in a year by the frequent stoppage of the mill in order to replace and make these repairs at once becomes a monetary question, which must be added to the cost of the excessive repairs.

A stamp mill can reach maximum capacity only through the aid of a perfect system of rock breaking, sizing and automatic feeding; besides, these factors are an efficient aid in the matter of amalgamation and concentration.

In the matter of machine feeding, it is safe to say that the automatic feeder is superior in every detail to the shovel, for man is human and the temptations known to stamp mill feeders, or other men, cause them occasionally to neglect their duty. Every mill should have an automatic sampler for tailings. This is an apparatus too frequently left out of the mill entirely. The lack of proper tailing samples is one

of the consequent losses of gold due to had milling, which is the result of ignorance on the part of the mill man as to what he is doing. It is to the mill owner's interest to know what is being lost in the tailings. It is to the mill man's interest to have the tailings run low; the hand sampler will soon learn to sample to an idea of his own, while an automatic sampling machine can not be coached. The grinding pan or clean-up barrel is another machine frequently left out in the construction of mills. Many mill men object to these as an aid in cleaning the residue from the mortars after taking out old shoes and dies; they claim that the grinding process of the machine causes the mercury to flour and a loss is sustained. This loss can generally be prevented very easily by giving the barrel a slower motion and adding a small amount of perchloride of iron to the contents to be ground. Mercury traps should not be discarded where amalgamation is

lunch. Mine owners do not like to spend a few hundred dollars in advice or experiment previous to the construction of a milling plant, but actually enjoy ordering a \$150,000 mill, and, too frequently, after it is completed and put in operation, they find that the plant or process is not adapted to the character of the ore, and, from this frequent haste and ill judgment, we find so many failures in our mining camps, which are monuments to folly. Among these many failures, the question often comes up: "Will the stamp mill continue to survive, amid the many inventions daily made; will it continue to compete successfully with the unending number of pulverizers and amalgamators, together with the army of new processes which the active brain of man brings forth from time to time?" Looking over the field of competition and the continued failures of the army of ill-devised machines, which their originators fondly he-

Mistakes of Miners.

From that section where California, Nevada and Arizona boundary lines approach, an old-time miner and traveling correspondent sends a letter which is chiefly of interest in contrasting past conditions in the business of mining. Revisiting where he was an active worker many years ago, he says:

The first thing which caught my eye was the relics of an old concentrating plant built eighteen years ago, and which cost a man in San Francisco who put the money up for a relative, \$86,000. It had five stamps and two concentrators. Miners from all over the county brought their ore to it to have it concentrated so as to save freight charges, which was in those days \$125 a ton to San Francisco. I mention one case in particular to show you how the miners fared. One mine owner brought in to the concentrator over five tons of ore which assayed \$264 per ton. He wanted to ship his ore to San Francisco, and to save the freight charges of \$125 per ton he concluded to have it concentrated, the five into one. He was advised by an old miner and mill man not to do it, but he did, and after the five tons were concentrated into one the one ton of concentrates assayed \$266 a ton. The man who brought the ore in and who was superintendent for the company walked the floor, but to no purpose. His values as per ore assay were gone, and others were treated the same way. The concentrator, or those who run it, was a failure, and it got no more work to do. It lay idle for a long time, and the concentrator that cost \$86,000 was finally sold to a man who moved it away, for \$2500.

Half a mile further I came to a 5-stamp chlorination mill that was built in the winter of 1875-76, and it was one of the best built and best equipped little mills built on the coast; but the siding on that mill and the shingles are not paid for to this day. The mill turned out the first bar of hulsion in February, 1876, and everybody had a grand time, had a ball in a saloon, where they preached and prayed on Sunday for want of a better place.

A little history of the workings of that mill, the crushing of ores and the treatment miners got would be of interest to your readers.

Chloriders and miners would take their ore to the mill to have it crushed, the mill man charged \$50 a ton for crushing, and he allowed us 80% of the assay value of the silver in the ore; nothing for gold, no matter how much was in our ore. They claimed they didn't save it, that it went up and out of the smoke-stack. He charged 15% discount on all the hulsion and from 2% to 10% moisture. So that really if a miner took \$100 ore to the mill he was lucky if he got his sacks back, which he paid 25 cents apiece for. And in this connection let me enumerate some of the prices we had to pay to produce that ore: Powder, \$1.50 per pound; fuse, \$2.50 per 100 feet; caps, \$2.50 a box; candles, 75 cents and 80 cents per pound; a plug of tobacco, \$1.25; sugar, three pounds for \$1; bacon the same; hams, 45 cents to 60 cents per pound; flour, \$13 per 100 pounds, and all things in proportion.

But there came a change. The superintendent of that mill company paid a great many chloriders for their ore in checks on a bank in San Francisco, and by some hocus pocus they had no mail come there for three months. Finally the checks came back endorsed, "Not paid for want of funds," and the superintendent left there between two days and forgot to come back; then the sheriff steps in, and after the necessary time the fellow that charged them the above price bought it. After a while he started the mill up on the same old basis. The miner paid him the same old prices for what he ate and wore, and so you may judge the enormous profits they were making out of the miners. He ran the mill at odd times for about three years, working ores up only to 60%, for the reason that those he hired to run it did not know their business and they were not chloridizing their ore. But there was a great mass of tailings accumulating from ores that would mill over \$500 per ton, and when they learned their business from a man who came there they worked those tailings all over and made a fine clean-up run a while, and sold the whole business to an Eastern company from Ohio. The Ohio company sent out a man to work the mine and mill, with the result that they had better paid him \$1000 a month to have stayed in Ohio, as he did not know hardly what he was sent out for, only his health and spend stockholders' money. So there was a "failure," the mill shut down, a man was hired to watch it; he finally sold the company for his pay, the stockholders wouldn't put up any more money under the management, he got judgment and now the mill is his, and it is hardly worth that much old iron, but there it stands, rotten and rusty from the foundation up, a "monument of rottenness



Captain Vein No. 7, 400-Foot Level, No. 2 Shaft, Portland G. M. Co., Cripple Creek District, Colo. (See Page 187.)

carried on by stamp mills. The arrangement of the stamp depends somewhat upon the location of the mill; if the site is level and the mill large, it is better to arrange the battery in two rows back to back; when a graded mill site is used on a sloping hillside, the batteries are arranged in one single row. This is a better arrangement, as the hillside gives the desired elevation for the different departments of the mill and makes a better condition for lighting the building.

The stamp mill of late has suffered much in reputation from the frequent failure of the designer or constructor to adapt the arrangement and construction of his mill to the character of the ore to be treated. The mine owner orders his reduction plant about the same as a man orders his dinner; he goes to the agent of a well-known manufacturer of machinery and tells him about the mine and the probable character of the ore, and then leaves the plan and management of the mill to him, the same as a man enters a restaurant and directs the head waiter to serve him with a good

lied would revolutionize the reduction of ores, there is every reason to believe that the stamp mills will continue to survive amid all of these new inventions and enjoy a career of further usefulness.

In conclusion, to mine owners and mill men who intend to build stamp mills: First, study the character and requirements of the ore to be treated, and, if necessary, go to some expense in experimenting to find out the true process of your ore; or, better still, employ a competent expert in that line, who is able to judge which is the real system by which to treat your ore. That done, design your mill according to these conclusions; employ the most competent millwright to superintend the construction of your plant, a man who can run the mill after he has built it and understands every detail of its operation; use your stamp mill intelligently and observe each and every one of its continued operations; take advantage of every occasion to use any new contrivance or change, which experiment and common sense may sanction.

and bad management," and a disgrace to the camp. An old timer says it would have been a blessing to the district if it had burned down before it turned a wheel.

Proceeding to the town: On the corner is an old Courthouse which is said to have cost the taxpayers over \$26,000; it never was worth over \$2500. The county must have been cursed with as bad a gang of boodlers as St. Louis. There is one store, saloon adjoining and Postoffice, the regular gang of sitters holding down chairs, all waiting for some one to come in and ask them to drink, peering and wondering who we are and why we intrude on their seclusion. They abuse people who come in to do something and abuse them if they don't, and the big fat fellow who runs the place laughs and joins with them in a drink. There will be a day, and it is not far hence, when there will be a chlorination plant and works here, with tramways from the different hills and mines right into the mill pounding away on rich ore. Ores can be worked here for \$3 per ton with the proper mill.

Shaft Sinking.

Written for the MINING AND SCIENTIFIC PRESS by
C. K. COLVIN, M. E., Denver, Colo.

So far as the writer knows, little has ever been written on the subject of sinking and timbering perpendicular cage shafts by the mining engineers of the country for the working of metalliferous mines. I have given this subject a great deal of thought and study, and it has been my fortune to have had the opportunity to put my ideas into practical application.

As every miner knows, the shaft of a mine—if it be worked by shaft—is the principal thing about it; in fact, it is the mine itself, and, further, it is the most expensive part of mining and, consequently, should be done intelligently.

When a shaft is completed, or, rather, when it is started, it should be of sufficient size to accommodate the transportation required, and no larger, as it is useless to spend time and money in breaking and timbering extra space that can not be utilized; it adds to the expense and there is no return from it.

The last shaft sunk by the writer was, in his opinion, as near the proper size for the ordinary working shaft as can well be figured. This shaft was 5'x12' in the clear, divided into three compartments, making two cageways and a third compartment to accommodate ladders, columns, etc. This necessitated an original break of 7'x14', as 8'x8' sawed timbers were used. If it were in bad, heavy ground, large timbers would, of course, be necessary. In the breaking two 3' air drills were employed, working on crossbars at each end of the shaft. These columns, if properly set, will enable the operators to drill up their rounds without any change of setting; it allows them to keep the corners out, as well as giving a good slant to the sump holes, and in ordinary ground nine holes on a side will complete the round. The depth of these holes depends on the cut or sump, and that, of course, depends on how the ground breaks.

In dividing this size shaft into three compartments, allowing for two 6' dividing pieces, it leaves two hoisting ways 4'x5', and a ladderway 3'x5'; using 4'x6' guides, the wide face in the shaft leaves a hoisting compartment 3' 4'x5' clear of everything. This will accommodate a cage with a 20" or 24" gauge track, and an ore car with a box 2' high, 2½' wide and 4' long, having a capacity of 20 cubic feet, which in round numbers is equivalent to one ton of broken rock. When these cars are new and stiff, they are about all one man can handle, but after they become worn and limbered up one man can handle them very easily. Hence, they are about the maximum size. They are not so high but that men can shovel into them handily; otherwise they might be built 6' higher, in which event they would hold 25 cubic feet, or about 1½ tons. This, however, would be too much for one trammer and not enough for two.

Some one may say that the sized shaft mentioned above is all right, but too small for a big mine. It is possible to hoist through this shaft, with double-deck cages, 2000 tons in twenty-four hours, which allows about three minutes for each trip, and most all of the heavy-duty hoisting machinery of to-day is guaranteed to hoist from 1000' to 2000' per minute. There is one condition, if encountered, in which this shaft, or, rather, the compartment for ladders and columns, might be too small, and that is where there is an excessive flow of water to be handled, in which event the shaft should be made 2' longer (5'x14' in the clear) which would make the pumpway 5'x5'.

These cages will accommodate nine men on each deck, or thirty-six men on the four decks at each trip.

For general uniformity and from an economical standpoint, the writer is of opinion that the dimensions herein given of shaft, cages, etc., are well adapted for any ordinary mining.

The square or staddle sets employed in timbering the above described shaft are very much the same as the ordinary set, with the exception that these sets have a 1' miter at the ends or corners, as well as being shouldered, which gives the full strength of the timbers, placed from 4' to 6' apart, depending on the weight and condition of the ground.

The shaft in question was sunk 900' and the records

show only three broken timbers from blasting. This was accomplished by what the miners called "the float." This not only protects the timbers, but also protects the men in the bottom of the shaft, as well as forming a staging, or platform, on which the timber men do all their work, and permits the work of timbering and sinking to go on at the same time without hindrance to either in any great degree. The timbering in this shaft was kept as close to the bottom as possible to allow head room for the shaft men.

The "float," after being constructed in several different ways, was found to be more durable when built as follows:

Take two thicknesses—three would be still better—of 1" boards, laying one lengthwise and the other crosswise, and nail together, after the fashion of a barn door. On each side of this bolt one ¼" boiler plate, covering the entire surface on both sides; use ½"x3½" bolts; put clear through and draw up tight; use plenty of them. The wood center acts as a cushion and protects the plate. Eyebolts should be put in near each corner, connected with chains across the ends.

Swing the float under the last set of timbers by means of chain blocks, hooked into the chains connecting the eyebolts, at each end of the shaft, the blocks being suspended from cross pieces resting on the sets above. Two-ton chain blocks will handle it, but heavier ones are better, as there is a heavy strain on them. The float should be built large enough to extend beyond the timbers at least 2 inches on all sides when swung into place. It will be necessary to put this together in the bottom of the shaft, as it will be too large to go down—under the middle compartment, which should be used as the bucketway when sinking, as it lands the bucket near the center of the shaft, where the muckers get on all sides of it. There necessarily must be a hole for the bucket to pass through to the bottom. When blasting, this is closed with some kind of a chain net, and the float should be drawn up tight against the timbers.

When the shaft is ready for another set, the timbermen drop down onto the "float," and, by means of the chain blocks, lower it down the proper distance, and they are ready to go at their work without any material interference to the shaftmen under them. After several months' use, the float will become cupped up from the force of the blasts underneath it. When this happens, lower it down to the bottom and turn it over, and that same force will straighten it out again.

When a bucket is employed in a shaft of this kind, it is necessary to use an idler or crosshead to keep the bucket from swinging. This is simply a frame working on the guides, supported by the chain hook or bail of the bucket. Near the bottom of the timbering or guides there should be chockblocks to stop it from leaving the guides and going into the bottom of the shaft, the hole in the idler being large enough for the cable to slip through and allow the bucket to pass on to the bottom.

Another very convenient device employed by the writer was a bell line contrivance. As every miner knows, a good bell line is a very important thing, es-

pecially when sinking, as very often endless trouble and delay are caused. Wires of an electric signal are not good in the bottom of a wet, muddy shaft, and a line with knots and splices is equally as bad. The device referred to is simply a wooden drum 24" in diameter, with an 8" or 10" face, with 4" or 6" flanges, dependent on the amount of rope required. Put a 1" round iron shaft through it, loose; take a bar of iron ½"x2½"x4' long, drill hole 14" from end and slip onto the shaft; attach small line to short end of bar or lever (wire preferably), pass over small pulley and into engine room, where attach to bell; on the long end of the lever put counterbalance to take up weight of the line suspended in the shaft. A weight is better than a spring for this purpose. Have the long end of the lever work in a slot so as to control the sweep, which will be from 6" to 12".

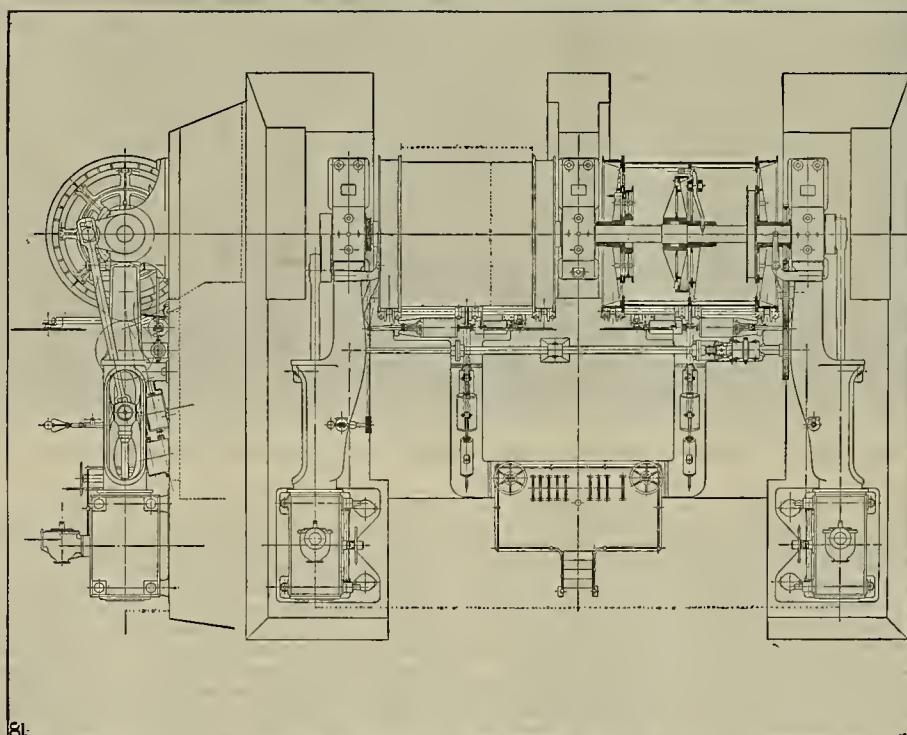
On the side of the drum next to the lever put four engaging dogs, made out of ½"x1" iron; put on with screws; place near the outside rim at equal distances apart, so that two dogs will engage at the same time, the dog at the short end of the lever resting on the top side of the lever and the other one reversed, so that when the drum is turned toward the short end it pulls the lever down and rings the bell in the engine room. The shaft line, whatever length required, is suspended in the shaft (¾" hemp), the surplus wound on the drum; the drum is then located as near over the collar of the shaft as possible, avoiding sharp angles for the line, the drum shaft being set in horizontal bearings.

Whenever it becomes necessary to lengthen the shaft line, simply turn the drum back until the dogs release or disengage the lever, then unreel whatever length of line is required, re-engage the dogs and the line is again ready for use. Sufficient space must be left between the drum and the bearing to permit the lever to be slipped clear of the dogs when lengthening the line, which is a matter of 2" or 3".

There is one thing more the writer wishes to speak about, and that is cage chairs. Never put them in a shaft. They are dangerous and expensive. There are several different patents of chairs that are attached to the cage; in the opinion of the writer, any one of these is preferable to the old-style chairs, which necessitates a set at each level. The writer has, however, used but one of the many different styles, and that was the Jelinek safety chair. For safety, convenience and economy there is absolutely no comparison between this and the old style.

RECENTLY the steel smokestack of the electric light plant at Canton, Pa., 100 feet high, needed painting. The fireman made a sort of kite or parachute which snugly fitted inside the stack. He attached a string to the parachute; the draft in the stack carried it and the string with it up through the stack and out, the parachute coming down outside the stack. A small rope was next tied to the string and pulled up, and finally a rope strong enough to hold a man. Then tackle was arranged to haul up a man to do the painting.

To date 1280 patents for using oil as fuel have been granted by the United States Patent Office.



Hoisting Engine at Oliver Iron Co.'s Mine, Ely, Minn.

In the issue of the 20th ult. appeared a technical description of a new double-drum Corliss engine, built by the Sullivan Machinery Co. of Chicago, and installed at the Savoy-Sibley shaft of the Oliver Iron Co.'s mines near Ely, Minn. By mistake, another

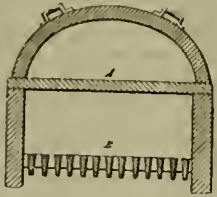
illustration of one of the Sullivan Co.'s make of hoists appeared therewith. The illustration that was designed to accompany that article is here given place. Reference thereto, in connection with the article on page 164 of the issue of the 20th ult., will make the entire matter clear.

Mining and Metallurgical Patents.

Patents Issued September 23, 1902.

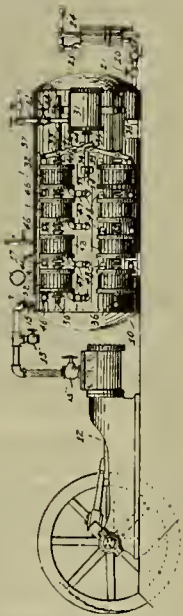
Specially Reported and Illustrated for the MINING AND SCIENTIFIC PRESS.

PROCESS OF ELIMINATING THE SULPHUR FROM SULPHIDE ORES.—No. 709,482; A. Gutensohn, London, England.



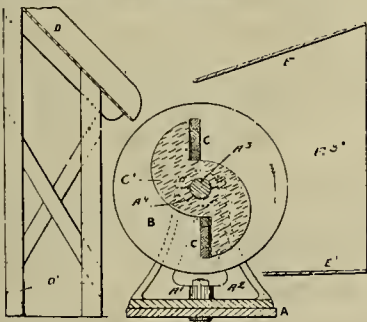
Process for elimination of sulphur from sulphide ores, consisting in crushing ore, mixing it with crushed iron pyrites, carbon and sodium salt which will yield sulphide of sodium when mixture is heated, amount of carbon added being largely in excess of amount required to form sulphide of sodium, heating mixture to temperature approaching incipient redness, adding sodium chloride during heating, then exposing it freely to air to effect oxidation; burn off all sulphur that is set free.

AIR COMPRESSING APPARATUS.—No. 709,520; E. J. St. Croix, Madrone, Wash.



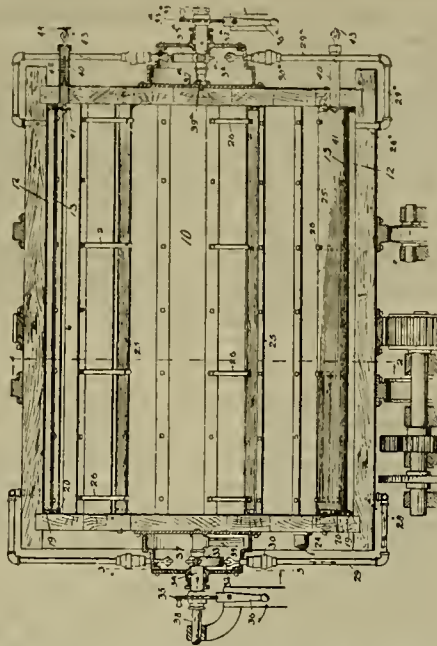
Apparatus for compressing and storing air; reservoir; main conduit adapted to convey air under pressure to reservoir; gate valve to control conduit; second gate valve in conduit closely adjacent to reservoir; auxiliary conduit adapted to convey steam to main conduit; gate valve to control same; driving cylinder; branch conduit leading from main conduit to cylinder, having gate valve therein; double series of air compressing cylinders, each of less length of bore than driving cylinder; series arranged within cylinders in tandem, disposed at opposite sides of center line of driving cylinder; conduit leading from one head of each compression cylinder to reservoir; port of ingress in end; check valve in last conduit; check valve arranged to control port; piston rod for each series of cylinders; like rod for driving cylinder; oppositely disposed levers operably connected to rod of driving cylinder, arranged to drive piston rods of compression cylinders; valve-operating mechanism for valve of driving cylinder, operably connected to one lever; manually operative air pump connected to reservoir.

CENTRIFUGAL TAILINGS ELEVATOR.—No. 709,721; W. Peck, Dunedin, New Zealand.



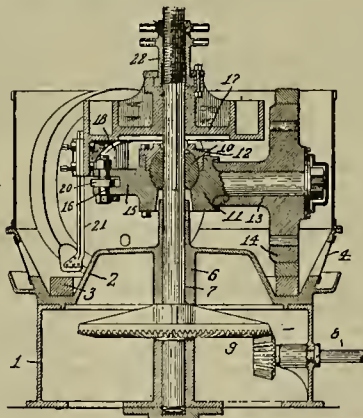
In machine of class described, wheel provided with beaters, being mounted for rotation, being free of an inclosing casing, whereby, on rapid rotation of wheel, material supplied thereto will be centrifugally scattered, standard of wheel being swivelly mounted.

APPARATUS FOR TREATING PULVERIZED ORES OF GOLD OR SILVER.—No. 709,593; D. C. Boley, Chicago, Ill.



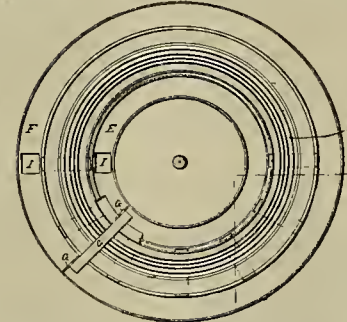
Apparatus for treating finely divided ores by filtration, combination with moving filter surface, of means for creating vacuum beneath filter as it passes portion of its course, means for producing at same time air pressure backward through filter as it passes another portion of course, means for producing at different time air pressure backward through filter, at same portion of its course, combination of rotatable barrel having around its inside surface series of chambers separated from interior of barrel by filtering fabric, means for inducing vacuum in chambers during portion of revolution of barrel, in part of pipes containing valves controlled automatically by cam caused to operate by motion of the barrel.

CHILIAN MILL.—No. 709,689; G. F. Waddell and W. J. Evans, Anaconda, Mont.



The combination of main shaft, sphere mounted thereon, spider hub loosely mounted on sphere, journal arms projecting rigidly from hub, rolls mounted on journal arms, die co-operating with rolls, drag arms projecting from hub, journal pins carried by drag arms, rotary annular pan discharging on die and rolls, secured to shaft above hub, journal pins projecting from bottom of rotary pan, links connecting journal pins of water pan to those of drag arms.

ORE CRUSHING MACHINE.—No. 709,822; C. C. Lane, Los Angeles, Cal.



Ore crusher, comprising revolving frame; revolving crushing rolls mounted in frame; tread for rolls composed of plurality of concentric rings, having spaces therebetween; supports for rings; screens below tread, adapted to deflect crushed ore into troughs

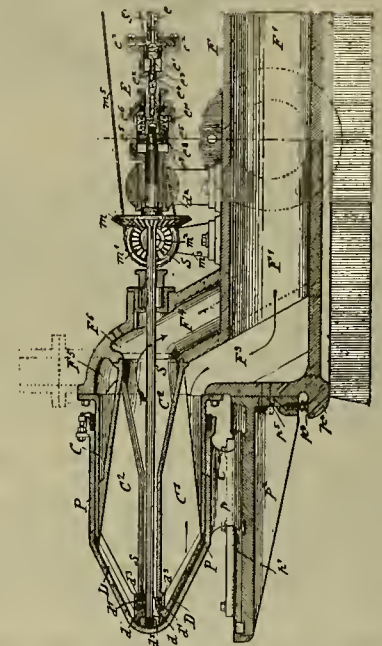
at side of and below tread; arms affixed to revolving frame, having scrapers on bottom thereof, adapted to work in troughs.

ELECTRIC IGNITER FOR EXPLOSIVE ENGINES.—No. 709,598; H. A. Gray, Plainfield, Ill.



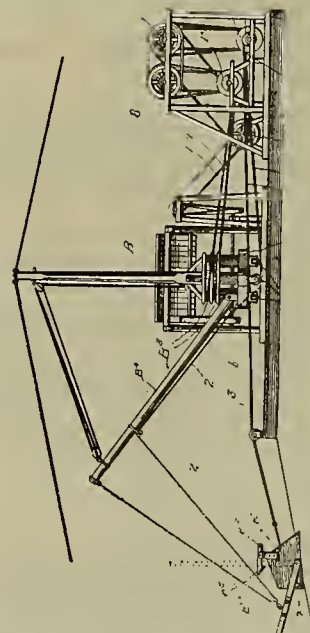
An explosive engine, in combination, cylinder, valve therefor, cam driven by engine moving rod, movable electrode, second electrode, shaft comprising two sections to one of which second electrode is fixed, clutch for coupling two shaft sections, one of the members of which is slidably mounted upon shaft, pin projecting from clutch member, arm secured to valve rod having beveled extension for engaging pin to uncouple clutch and also turn shaft section to which electrode is fixed, spring for coupling clutch when arm is withdrawn from pin, governor, pivoted lever actuated by governor for engaging valve rod when advanced by cam.

ROTARY SLIDE VALVE FOR PUMPS, COMPRESSORS OR MOTORS.—No. 709,682; L. Roedel, Passaic, N. J.



Combination, with two stationary cylinders having interior inlet and outlet channels, of slide valves on heads of cylinders, shafts connected with slide valves, means for imparting rotary motion to shafts, balancing device between inner ends of shafts, balancing device consisting of differential piston, larger piston, cylinders for piston, couplings between shafts and cylinders.

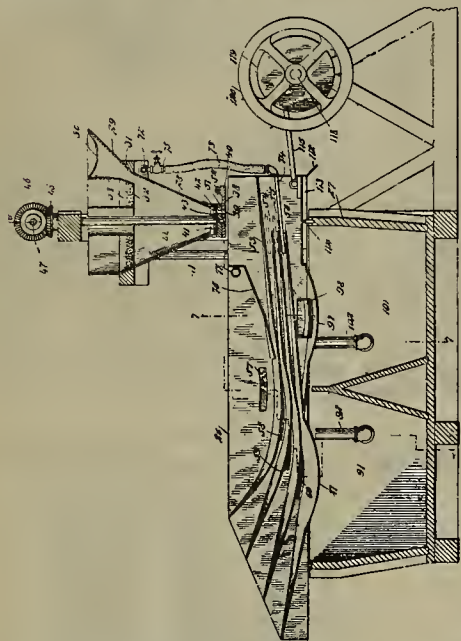
MINING DREDGE.—No. 709,733; H. J. Barton and A. C. La Buò, Oakbar, Cal.



In mining dredger or excavator, scoop of shovel form, draft loop connected to lateral walls of scoop just above center of height thereof, rear handle lever pivoted to scoop, catch carried by scoop for holding lever upright, loading drum located near surface of

ground, draft or loading cable carried by drum, connected to draft loop, hoisting cable connected to handle lever.

CONCENTRATOR.—No. 709,770; J. A. Holmes, Salt Lake City, Utah, J. F. Wood, Denver, Colo.



An ore concentrator, comprising sluice box, means for imparting longitudinal reciprocating motion to box, series of pans arranged in box one above another, pans being longitudinally curved and inclined laterally, discharge openings through side walls of box at highest side of pans, discharge and inlet openings at opposite side of box, reservoir upon which box moves, receiving pan carried by box adapted to be submerged in water contained in reservoir, inclined amalgamated plates for receiving material from receiving pans, plates being arranged in reservoir, mercury troughs supported below plates.

MANUFACTURE OF ALLOYS OF THE ALKALI METALS.—No. 709,489; G. F. Jauhart, Paris, France.

Method of manufacturing alloys of alkali metals, such as potassium and sodium, which consists in mixing one of the metals with caustic oxide of other metal, then heating mixture in vacuo at temperature of from 200° to 300° C., and in then allowing residue to cool.

PROCESS OF PRODUCING CYANATE OF POTASSIUM.—No. 709,570; S. Zuckschwerdt, Leopoldshall, Germany.

Separation of cyanate of potassium from cyanide and carbonate, thereby producing pure cyanate of potassium, first treating salt mixture obtained from synthetic cyanogen processes, with sufficient water to dissolve carbonate temperature not over 66° centigrade, whereby cyanide and cyanate remain undissolved, then treating remaining undissolved salt mixture with sufficient water to dissolve cyanide temperature not exceeding 5° centigrade, whereby cyanate remains undissolved.

ELECTRICALLY TREATING ORES.—No. 709,817; C. E. Dolhear, Boston, Mass.

Method of reducing metals from their ores which consists in dissolving crushed ores in nitrate of suitable metal, adding to mixture thus formed sulphuric acid, subjecting solution to action of an electric current, whereby metal is plated out of solution.

PROCESS FOR TREATING TELLURIDE GOLD ORES.—No. 709,038; W. Pethybridge, London, England.

Process for recovery of gold and tellurium from telluride of gold contained in ores, consisting in treating pulverized ore with solution of ferric sulphate, used alone; separating filtrate from solid residue; treating residue for recovery of free and solid gold therein, treating filtrate for precipitation of tellurium by metallic iron and boiling, separating further filtrate of ferrous sulphate, and converting ferrous sulphate into ferric sulphate by oxidation.

PROCESS OF MELTING NICKEL.—No. 709,218; H. L. Haas, New York, N. Y.

Continuous process of melting and refining nickel containing carbon, consisting in subjecting column of mixture of nickel in granular form directly with fuel to heat; passing large quantities of air under excessive pressure upwardly through entire column of nickel and fuel, to assure temperature above melting point of nickel and to oxidize carbon in nickel; allowing melting nickel to flow downwardly through mass and in contact with air, drawing off melted nickel with more or less continuity below column; supplying

fuel and granular nickel as necessary to top of column to maintain temperature and continue process.

PROCESS OF DESULPHURIZING FURNACE GASES.—No. 709,358; E. Pollacsek, Budapest, Austria-Hungary.

Method for desulphurizing furnace gases which consists in passing gases through sponge-like material formed by action of gases upon mass consisting of ten to fifteen parts by weight of sawdust, thirty to thirty-five parts by weight of not-caking fuel, twenty to twenty-five parts by weight of caking fuel, thirty to thirty-five parts by weight of peat and six to twenty parts by weight of caustic lime.

The Gold Production of North America, Its Geological Derivation and Probable Future.

NUMBER II.

The most important gold belt in North America is that stretching along the Pacific coast. It is throughout characterized by free-milling quartz ores with auriferous sulphides. A great erosion has taken place since it was formed, and here, too, as in the pre-Cambrian deposits, we have to deal with the lower part of veins, the upper parts having generally been removed to the extent of thousands of feet in many places.

Beginning in Baja California, Mexico, 100 miles or more below the boundary lines, this great belt continues through San Diego, Los Angeles and Kern counties up through the central part of California, where it is developed in great strength; then up to northern California, southwestern and northeastern Oregon. In the latter State it is modified by the appearance of many silver-gold deposits and veins carrying auriferous sulphides without free gold. Covered for a distance by the lava flows of the Cascades, it again appears in southern British Columbia, on Vancouver Island, among other places. Strong development is again attained in the Cariboo district in central British Columbia, and it continues through Omineca, Cassiar and Atlin districts to the Klondike region, and thence, bending westward, follows the Yukon to the western end of the continent at Nome, on the Seward peninsula.

Throughout this immense stretch of country the veins are accompanied by great development of placers; they are indeed characteristic of this class of gold veins and by far most of the product has been obtained from placers. At many places in California, as well as in Oregon and Alaska, the veins from which these placers were derived were very disappointing, the fact being that the primary deposits are often scattered in many little seams, rather than concentrated in great veins. California alone has yielded \$1,300,000,000 from this belt, Oregon \$55,000,000, British Columbia and Northwest Territory \$120,000,000, Alaska \$31,000,000; a total of over \$1,400,000,000. During 1900 the belt yielded \$50,000,000, of which one-half came from British Columbia and the Yukon. This represents a great increase compared with the figures of ten years ago, and the question is whether this increase will be maintained. At least \$27,000,000 were obtained from the new placers on the Yukon and in Alaska.

If no further great discoveries are made in this region our knowledge of placers forces us to the belief that this last figure will rapidly decrease. Even if the placers gradually decline in the northernmost territories, it is believed that increased quartz mining will in some degree compensate for this; but the quartz mines have usually in the older districts yielded less than the corresponding placers. California's output will doubtless be maintained at about the present figure for many years.

Besides the Pacific gold belt there is a broad zone in the central and eastern part of the Cordilleran region which contains an abundance of Mesozoic gold deposits. Many of these seem to have been formed a little later than the California gold quartz veins, perhaps largely at the very close of the Cretaceous, or possibly at the very beginning of the Tertiary period.

This broad zone begins in Mexico, where the Pacific States of Sonora and Sinaloa contain many veins in pre-Cretaceous sediments, granites and crystalline schists. Some of those in Sonora occur in Triassic rocks and are considered to be of the same age as California veins. Similar deposits in old rocks continue through the southwestern part of Arizona, but their age is not definitely known. Prominent veins are those of the Congress, Fortuna and Gold King mines.

Similar deposits appear again in Nevada and Utah. In Nevada a few of them are free-milling gold quartz veins, but in the majority the ores are sulphides alone and silver exceeds the gold as to the value in them.

In Utah the principal gold mines are those of the Mercur district, in which ores suited to the cyanide process occur in limestone close to intrusive sheets of porphyry. These yielded over \$2,000,000 in 1900. Most of the remaining amount credited to Utah is derived from gold-bearing ores of the smelting class, which are found in veins and irregular deposits in sedimentary rocks close to bodies of intrusive (Cretaceous?) porphyries. The future of the gold pro-

duction here is very closely connected with the vicissitudes of the silver market. In Colorado the most important Cretaceous gold deposits are those of Leadville. Here, again, the ores occur in carboniferous sediments near porphyry contacts, and the gold production, small until a few years ago, reached \$2,700,000 in 1900.

In Idaho and Montana the late Mesozoic veins are developed on a large scale. We note here the interesting fact of a junction with the Pacific belt, through northeastern Oregon and central Idaho, into Montana. Going eastward, the free-milling and quartzose character is partly maintained, but silver becomes more prominent in the ores, and auriferous smelting sulphide ores often replace the native gold. Central Idaho contained many rich placer camps which have yielded their millions, like Oregon, and in Montana the first years of mining were largely monopolized by the placer deposits. The great producing quartz mines contained, however, much silver, and the pan amalgamation is the most common process.

After the exhaustion of the placers, silver ores containing a little gold were extensively worked by smelting. This industry has declined during the last years and, instead, at least \$1,000,000 per annum is obtained as a by-product from the smelting of Butte's copper ores.

The majority of gold-bearing veins in Idaho and Montana are genetically connected with the intrusion of very large bodies of granitic rocks during the Cretaceous and very earliest Tertiary period. This explains the fact of relationship with the Pacific gold belt mentioned, for there, too, the veins stand in undoubted casual connection with the great Mesozoic granitic "batholiths," as the large intrusive bodies are called. As far as we know, these batholiths are either absent or only developed on a small scale in Nevada, Utah and Arizona. The veins were found in this granitic rock and also, perhaps, chiefly in the zone of more or less altered sediments surrounding them. They were undoubtedly formed after the consolidation of these granites and probably by waters heated by the vast coloric resources of the intruded rocks.

Montana has probably produced about \$175,000,000 of gold since discovery, and the output in 1900 was \$4,700,000. Milling and cyaniding ores contributed \$2,300,000, copper ores \$1,100,000, and other smelting ores \$700,000. The placer output was \$500,000.

Looking at this of the central Cordilleran gold belt as a whole, it is believed that, north of Mexico, it has produced at least \$310,000,000 since discovery, and during 1900 its tribute to the total of North America was about \$16,000,000.

In this great chain of deposits the gold production is closely associated with the silver and copper industry. The effect is, perhaps, to make it more stable. According to past experience, no wonderful increase of production may be expected, but rather, perhaps, a steady maintenance and, perhaps, a gradual increase. Placer mining, with its dwindling tendency, is almost eliminated in the consideration of this belt.

(TO BE CONTINUED.)

Crocker-Wheeler Branch Office Managers' Convention.

The Crocker-Wheeler Co. held at its works at Ampere, N. J., on September 25-26, its annual managers' convention. On the evening of the 25th the annual banquet was held at the Engineers' Club. Those present were the officers of the company—Schuyler S. Wheeler, Gano S. Dunn, W. L. Brownell, Putnam A. Bates, C. N. Wheeler and F. V. Henshaw; and the branch managers, Samuel Russell, Jr., Julian Roe, J. Hally Craig, Louis P. Hall, W. H. Wissing, Francis B. DeGress, Henry J. Sage, William A. Dohle and Harold Lomas.

At this dinner there were many interesting speeches made by the branch office managers who came from the various districts throughout the entire United States. During the evening Francis B. DeGress of the company's New York office, he having been in the service of the company longer than any of the other branch office managers, presented to their general sales manager, Putnam A. Bates, in the name of the managers, a token of their esteem and an acknowledgement of his efforts in their behalf, which Mr. Bates responded to in his usual happy manner.

The purpose of the convention is to bring all of the men closer together and give them an opportunity of comparing notes and planning methods for handling the largely increased business of the company.

Specimens Wanted.

TO THE EDITOR:—Can you tell me a locality in California or Oregon where I can get a ton or more of nicely colored rose quartz, handy to transportation, and the name of anyone I could write to? Also, can you give me the same information in regard to pink satin spar and Iceland spar? F. T. S. Copper Mountain, Alaska.

At a meeting of the American Institute of Electrical Engineers in New York City last Monday, President Scott said that since the organization of the institution in 1884 the value of electrical installation in the United States, outside of telegraph and telephone plants, had increased from \$1,000,000 to \$4,000,000,000.

Mining Summary.

Specially compiled and reported for the
MINING AND SCIENTIFIC PRESS.

ALASKA.

Near Anvil creek, the ancient channel gravel beds above the present water course are being worked. Twenty men are at work on No. 4 above, ground sluicing and shoveling in, and the work is paying satisfactorily. Sixteen thousand dollars was cleaned up after a three-days' run. No. 5 Anvil has lately been bought by the Pioneer M. Co. for \$125,000.

Manager Leland of the Mlocene Ditch Co has brought 5000 inches of water to Anvil mountain and will be able to deliver it on the creek under a 300-foot pressure. He agrees to handle the tallies of the creek properties and pay the owners of the claims a bigger percentage of profit than they obtained from working the ground. The pumping plants are proving a success, the first cleanup from Copper Gulch, where but little profit was made by old methods by the use of water supplied by the pumping plant amounted to several thousand dollars.

The Hot Air mine is on Glacier creek. One afternoon five sacks of gold, representing \$48,000, was brought in, representing one cleanup and the work of sixteen men shoveling in for ten days. In fourteen days this mine is reported to have yielded \$71,000 in gold dust.

At the Hot Air, Pioneer and other mines the season is so short in which sluicing and hydraulic mining can be carried on, it is imperative for the miner to utilize every available hour of time and there is no cessation of work night or day.

No. 6, owned and operated by the Pioneer Co., is yielding heavily. No. 8, the banner claim of the creek, continues to yield as heavily as any claim in the district. But little work is being done on 9, 10 and 11, owing to the scarcity of water. The prayers of the miners of Anvil, if they do, is for rain, and plenty of it. They figure it is just as easy and twice as profitable to run three sluings of boxes as one.

Juneau reports that the Rodman Bay section has started up again. One hundred men are employed at the Rodman Bay mines.

ARIZONA.

COCHISE COUNTY.

Ross, who with Nichols won the world's drilling championship at Bisbee last 4th of July, is reported to have made a good strike of \$125 ore in a new prospect near Bisbee.

The Bisbee Miner says: At the Modern Mining Co. sinking is resumed; drifting on the 200-foot level in ore will be continued.—At the Copper Glance fourteen men are employed.—The Black Diamond mine, 4 miles from Pearce, has machinery installed.—The Calumet & Arizona is having smelters built at Douglas. It is expected that they will be blown in Nov. 1.

For about two months, says the El Paso News, mining men of El Paso have been negotiating for the purchase of the Vulture mine.

The Old World Fair M. Co. property, twelve claims, owned by Shattuck & Williams, 2 miles east of Bisbee, shows ore that gives 30% copper. Hoisting machinery has been ordered.

The Copper Queen M. Co.'s daily output and shipment of copper will remain about the same until the completion of the new smelters at Douglas. Superintendent Douglas has returned and there may be considerable new work started.

GILA COUNTY.

President Smith and some of the other directors of the Old Dominion Co. are to visit the mine. The recent shut down of this mine and smelter has been such a calamity to Globe that hopes are entertained that this visit means something toward the resumption of operations.

The Globe Silver Belt is told that the United Globe has from the Federal smelter at El Paso a flat rate of \$13 per ton on copper ores shipped from Globe, payment to be made by the Federal on a basis of 3 cents below New York quotations on electrolytic copper, and that lessees are preparing to take out ore for shipment.

GRAHAM COUNTY.

H. C. Anderson, superintendent Shannon Copper Co., is building a new concentrator and expects it to be running May 1, 1903. It will be framed of wood, instead of steel, as first intended, as owing to the orders now piled up in the steel mills, it would delay the completion of the concentrator for four or six months if the company should wait until the steel for framing could be supplied.

Clifton says forty-seven tons of copper ore shipped from the Standard Copper

mines to the smelter last week netted \$1002. Ninety tons of the same class of ore will be shipped this week. During the present year the Standard has received over \$18,000 net from ore shipments.

MOHAVE COUNTY.

(Special Correspondence).—Going towards Chloride one passes some fine prospects. The Pinkham, Midnight and Sunlight mines are working away taking out ore for the smelter which is to start in a few days. Mr. Heard, the vice-president, is at the smelter having some new machinery put in, which was the cause of his not firing up sooner. The smelter is all right and every one hopes for its success. Everything around here and everybody has a business appearance. The Mluncosota and Conner mines are working away, also the Tennessee. They are starting up the Elkhart above Chloride. There is also talk of starting the Schuykill. Chloride is a thriving, busy place, but in some spots it needs a sanitary officer with a club. That whole section from Todd basin to Chloride is a remarkable mineral region.

Chloride, Sept. 22.

PIMA COUNTY.

F. Brownell, superintendent Producer M. & S. Co., near Covered Wells, Quijota district, near Tucson, will put in a 50-ton smelting plant.

O. B. Steen, of the Eureka M. Co., will put machinery on the mine. It will be hauled to the camp from Patagonia.

PINAL COUNTY.

W. I. Rand of Boston has bonded a large area of silver-lead ground near the Jack Rabbit mine and will begin operations next month.

P. P. Parker of the Copper Mountain M. Co., Copper Butte, 20 miles east of Florence, has the main shaft down 175 feet. The company will erect reduction machinery of large capacity. As they have a large amount of leaching ore in sight, they may elect to erect a leaching plant.

SANTA CRUZ COUNTY.

The Calumet & Arizona Copper Co., at Douglas, will double the capacity of their copper smelter.

YAVAPAI COUNTY.

Near McCabe, on the 27th ult., fire was discovered in the McCabe mine, owned by the Model M. Co., below the 200-foot level. The origin of the fire is unknown. As there are several miles of workings underground, all heavily timbered, it will be difficult to control the fire. The Gladstone mine, which adjoins the McCabe and connects with it, has hunkheaded its levels and there is little danger of the fire spreading to its workings.

At Mayer, on a spur of the P. & E. R. R., M. B. Boss is overseeing the erection of an oil burning smelter for the George A. Treadwell M. Co.

United Verde officials at Jerome have given out that the smelter will be blown in on Jan. 1, 1903. Others say it will not be. From a force of nearly 1000 men a month ago, there are now but five men employed. The superintendent has told those directly under him that they should keep him informed as to their whereabouts, so that they can be sent for when work is resumed, but in the meantime advises them to find positions elsewhere.

Superintendent Martin of the Monarch G. & C. M. Co. says in the drift to tap the ore body in the Eclipse claim small bunches of high-grade free-gold ores are encountered, which is an indication that they are in the neighborhood of the Eclipse ore. If this is correct, the mill will be kept in operation, as there is ore in sight to keep it running for months.

The Logan Co., operating on Cherry creek, have a shaft down 80 feet and have taken out thirty tons of high-grade ore.

At the Lion group thirty-five men are at work developing. There is a mill on the property and it will soon start up.

The Bradshaws report a strike in the Gray Eagle mine. A crosscut exposes ore 7 feet wide, 6 feet of which gives an assay value of \$30 a ton gold, and 1 foot \$75 a ton gold. The strike was made in a crosscut from a tunnel at a depth of 300 feet. The ore body is exposed for 700 feet. The mill near the property will be started up as soon as there is sufficient water. G. P. Harrington is general manager, T. Lee superintendent.

New York reports the purchase of the Congress gold properties, Congress, by the Development Co. of America: consideration not announced.

YUMA COUNTY.

At Quartzsite the Valenzuela has resumed.

CALIFORNIA.

ALAMEDA COUNTY.

The Yellow Metal M. & R. Co. has incorporated in Oakland; L. Cooper, H.

Lancaster, A. McGrach, G. H. Bennett, J. E. Shelter.

AMADOR COUNTY.

At the Kennedy mine the mill is crushing ore from the 2400 level. Superintendent Truscott at the South Eureka mine has the shaft below the 2300-foot level. The 20-stamp mill is in operation. At the Wildman, Superintendent Ross expects to soon resume sinking in the Emerson shaft, now down 600 feet.

At the Central Eureka mine, Superintendent Thomas, at a depth of 2000 feet has 10 feet ore.

The Jackson Ledger says the Sargent mine owners who contracted to sink 300 feet at \$11.50 per foot threw up their contract. They got down about half the distance and made fair wages most of the time, until the flow of water became so strong they could not control it. They asked the company to put in a pump to handle the water, which the company did not do. So the men quit.

The Moore mine is sold to W. A. Nevills for \$70,250.

At the Del Monte, during ten days of power drilling in August, 23 feet of tunnel was driven at a total cost, including labor, powder, fuse, candles, caps, water, coal and oil, of \$294.40, or \$12.80 per foot. During twenty-one days of hand drilling in August, 21 feet of tunnel was driven, at a total cost of \$254.30, or \$12.10 per foot. Amount of upraise driven in August, from old tunnel level, 14 feet, at a total cost of \$53.65, or \$3.85 per foot. Total length of upraise from lower stulls on September 5 was 37 feet. Total expense for construction, including labor on buildings, laying and moving pipe, during August was \$283.05. The total length of crosscut tunnel driven on September 1 was 289 feet. Assays show a value in free gold of about \$2 at this point, indicating that the ledge carries values, and will probably develop well on drifting. Water supply was cut off August 10, and has since been turned into the ditch in sufficient quantities to resume power drilling.

BUTTE COUNTY.

The Register says three new dredgers are being built near Oroville. The Leggett & Wilcox No. 2 is being constructed near the Faul place; the Butte near the Boston machine shop and the American 2 miles south of town. The Cherokee dredger has put on three crews and is running day and night.

The Western Power Co. has incorporated at Oroville; T. L. Neal, A. L. Stephens, B. D. Neighbors, T. H. Hastings, W. Henderson. This company has acquired rights on the headwaters of the North Fork and proposes to establish an electrical power plant. The company proposes to use the Big Bend tunnel which was dug for the purpose of turning a large portion of the bed of the North Fork of the Feather river from its natural channel, with a view of mining therein. The venture did not prove a success from a mining point of view, but the value of the property for power purposes in the generating of electricity has of late attracted attention. Arrangement was begun some months ago for the erection of a large power plant and the transmission of electricity to San Francisco.

CALAVERAS COUNTY.

At the Campo Seco M. Co.'s property the double-compartment shaft is 80 feet in depth, crosscuts east and west from the 60-foot level being in 50 feet in either direction. A 12 H. P. gasoline engine, capable of hoisting from a depth of 500 feet, furnishes power for raising rock and water and also drives the air compressor which supplies air for operating the machine drill. The engineer empties the bucket when hoisting either water or ore. When bringing rock to the surface the bucket is hoisted several feet above the ground, a hinged platform is dropped into place, the bucket is lowered upon it, and by pulling the rope the engineer tips the platform, dumping the rock into a car. In hoisting water the bucket goes to the top of the gallow's-frame and the engineer works a lever that swings a wooden trough beneath it, into which the water is emptied.

The Crystal mine has put up a gallow's-frame and timbered the mine to a depth of 100 feet.

The Record says a new 120-stamp mill will be put up at the Royal mine.

CONTRA COSTA COUNTY.

The National Paraffine well is down 1700 feet and it is expected to soon strike the oil sand.

FRESNO COUNTY.

The property of the Fresno Copper Co. is 18 miles northeast of Fresno. A two-compartment shaft is being sunk, one for the pumps, the other as a manway. The company will put in a 100 H. P. double-reel engine.

In Los Angeles Judge Welborn, in the United States Circuit Court, decides that in the controversy between the Copper

King Co., Ltd., and the Wabash M. Co. it is permissible for the parties involved to arrange for three expert mining men or engineers to visit the mines in question and make a report to the court of the actual condition and of the damage, if any.

HUMBOLDT COUNTY.

The Wild Goose Oil Co. abandoned its well at over 1000 feet, owing to a lost string of tools. The rig has been moved and a new well will be drilled.

KERN COUNTY.

Bakersfield reports that the effort to develop oil north of Poso creek has been abandoned. The Defiance Mineral, which has been operating for the past two years on Section 14, 23-27, is pulling the casing in its third well with the intention of quitting work. This well is down 1600 feet, and two other wells were sunk by the company to a depth of 1200 and 1400 feet, respectively, but without result.

MENDOCINO COUNTY.

A well at Point Arena is drilled over 530 feet, with oil and gas indications.

MONO COUNTY.

Near Bodie, W. A. L. Loose has relocated a claim near the Syndicate which has a 600-foot tunnel.

The Oxford Beta T. & M. Co., Aurora, has leased an assessment of 1 cent per share.

NEVADA COUNTY.

Jas. D. Hague, president North Star Mines Co. has made a report to the stockholders, in which among other things he says within the past few months the productive capacity of the mine has increased by a body of ore developed in the eastern portion of the old North Star workings, between the 1100-foot and 1900-foot levels, where a winze has been sunk from the 1100 about 350-feet downward, on the dip of the vein following continuous ore of very profitable quality, while the same rich ore body has been found, about 100 feet or more still deeper, by a long drift from the 1900-foot station of the main incline. Between January 1st and September 1st there have been mined from this newly developed ore body 3678 tons of ore, yielding about \$146,000, at a cost for all expenses of operation and development in these workings of \$40,000, an operating profit of \$106,000, or about \$29 per ton. The operating receipts of August were better than the stated averages, showing an output of 620 tons of ore, a product of about \$47,000, or over \$75 per ton, costs of about \$8000, or \$13 per ton, and a profit of \$39,000, or over \$62 per ton.

The operating profit from this source, about \$106,000, has been sufficient to pay all costs of development in the workings at the deep shaft, with all other incidental expenses of every sort, during the past eight months, and to leave a surplus of about \$35,000.

The superintendent reports that in the month of June the water hoisted from the main station, about 1600 feet vertically below the surface, averaged about 400 gallons per minute and amounted to 100 tons per hour, or 2400 tons per day, all raised to the tunnel level, more than 1400 feet high, but despite this a considerable amount of development work has been done.

The main raise, following the vein upward from the Central Shaft bottom, on the 4000-foot level, has been advanced 400 feet, showing a well-defined vein of fairly profitable quality all the way. Since January 1st, 7583 tons of ore have been raised and sent to the mill, producing \$54,511.65, or \$7.139 per ton. The clean quartz, mined by itself would probably average between \$12 and \$15 per ton, but it has been unavoidably mixed with so much waste in mining under existing conditions that the yield of all material crushed has but little exceeded \$7 per ton, sufficient to pay production expenses. The 3900-foot level has been driven westward more than 400 feet from the deep shaft, in the expectation of finding the continuation in depth of the main ore body of the upper workings, and within the past two months this drift has disclosed a very well-formed vein of good ore, which now promises to realize the above mentioned expectation. A sample of thirty-two tons of ore, broken along 60 or 70 feet of this drift, has been crushed lately as a test, yielding about \$17.50 per ton, about the recorded average yield of all the ore produced in the upper workings, amounting to more than 300,000 tons, yielding between five and six million dollars. This recent development Mr. Hague considers significant, giving assurance of productive and profitable operation of the mine for many years to come. He does not think it probable that water will permanently hinder mining operations in these deeper workings. Persistent pumping should ultimately check the excessive flow, which, under normal conditions, can easily be dealt with by pumps. The pumping capacity of the

deep shaft is now being doubled and it is probable that within a short time the difficulties existing hitherto will be wholly overcome.

Suit is begun in the Superior Court by the Pennsylvania M. Co. against the stockholders of the Grass Valley Exploration Co., or W. Y. O. D. Co., for \$525,000, in addition to interest and attorneys' fees, to determine a point which Judge Morrow did not touch upon in his recent decision in which the Pennsylvania Co. was awarded a verdict. At that time Judge Morrow intimated that he would appoint a commission to award the amount of damages. Shortly thereafter it was an open report that this portion of the original suit would be settled by the Exploration Co. turning over its mining property to the plaintiff in lieu of cash. A meeting to discuss this phase of the case was held in San Francisco on the 20th and continued until the 22d, when the negotiations fell through. The suit begun is the result. The complaint alleges that the defendant company within the past three years had removed 35,000 tons of valuable ore, estimated to be worth \$525,000, from the mill and 900 level of the Pennsylvania ledge. Should the plaintiff be awarded the final decision—for the case will be carried through all the higher courts if the Pennsylvania Co. wins in the Superior Court—the loss may fall on the stockholders of the Exploration Co. in proportion to the amount of stock each holds.

A two-fifths interest in the New Independence mine, near Graniteville, has been bought by J. Goodwin of You Bet. A new 10-stamp mill is building. C. M. Root continues as superintendent.

For the Union Hill mine Superintendent Creller has bought a 10-stamp mill formerly in use at the Engish Mountain mine near Graniteville. The mine is being unwatered.

The new 5-stamp mill of the Puscheck mine at Chicago Park is about finished. A new 120 H. P. compressor will be put in and the mine unwatered.

PLACER COUNTY.

At the Azalea mine, Blue canyon, 300 feet of main tunnel will be made this season. During the past sixty days the company has expended \$1480.09 in development work.

At the lower Forest Hill divide Russell & Burrage have started a new tunnel to tap 7 miles of the tunnel on the main divide at Peckham hill, 91 feet below the old Rough & Ready tunnel. The new is in 245 feet. The machinery comprises a steam compressor, blower, machine drills and a forty light power electric plant.

The Turkey Hill mine is sold at sheriff's sale for \$8193. The plaintiffs, Pereira vs. Hamilton, secured a judgment on labor liens. The property was bid in by A. K. Robinson for plaintiffs.

The Vore mine at Weimar will be reopened next season. The Crater mine, near Ophir, will be put in operation; also the Gold Blossom.

RIVERSIDE COUNTY.

The Ramona G. M. & M. Co. has incorporated at Riverside; C. H. Briggs, E. and R. H. Beall, A. A. Caldwell, D. F. Body, W. F. Jordan, W. F. Walke.

SAN BERNARDINO COUNTY.

San Bernardino reports the sale of the Iron Chief, on the desert directly east of Mount San Bernardino, for \$20,000, to J. F. Cullin of Pittsburgh, Pa.

Manager Thompson, at Vanderbilt, now has twenty-nine men at work on the Gold Bronze and St. George mines.

F. O. Wilkinson, who represents the Hearst estate, has received at Manvel (or Barnwell, as it is now called) 13,000 pounds of machinery to be placed on the Green Monster claim. A reduction plant will be placed on the property.

L. M. Gregory, president Giant Ledge G. & C. Co. at Manvel, claims to have smelting ore in sight. Water has been developed sufficiently in New York canyon at the company's millsite location.

The reports of Prof. G. E. Bailey of the California State Mining Bureau have attracted renewed attention to the deposits of niter near Death valley and a rush is reported to that desolate region. Expeditions are leaving Daggett, Borate, Randsburg and Mohave for the valley. Three hundred men are reported at Ballarat for information as to which portion of the desert is the best. The deposits are 130 to 145 miles from Daggett, 110 to 130 miles from Randsburg and 45 to 70 miles from Ballarat. They extend over a territory 25 miles long and 15 miles wide. No water can be found in the vicinity of the niter, Furnace creek, 35 miles distant, being the nearest point to the niter beds at which water can be obtained. Shafts have been sunk in the niter beds from 5 to 45 feet without finding any moisture. These shafts are reported in niter from the surface down. The most convenient point to the deposits is Ballarat, from which water must be carried. By way of

Ballarat the distance to the new Tarapaca is between 125 and 130 miles from the railroad, the terminus of the nearest line being Johannesburg.

SAN DIEGO COUNTY.

At Julian the Oro Blanco M. Co.'s tunnel is in 1100 feet and will be pushed this winter.

J. A. Wauchope, manager Noble mines, Pine Valley, is looking for men to be employed there.

SAN LUIS OBISPO COUNTY.

W. H. Wright is manager Pine Mt. and Oceanic quicksilver mines. In the early days of the local quicksilver excitement \$200,000 was expended on the Pine Mt. property. The company has felt its way along without undue expenditure of money. The usual retort was erected and ore from the old tunnels worked as long as profitable. The desired object was to discover the main lode. After sinking shafts and driving tunnels at points where good outcroppings appeared, a tunnel was started 300 feet below the summit of the ridge. This tunnel now reaches into the mountain 1400 feet. The owners will next spring put in a reduction plant, furnace, crushers, tramways and machinery for hauling ore. The company has its own sawmill.

SHASTA COUNTY.

W. F. Mitchell, manager of the Shasta G. & C. Co., tells the Tribune of Salt Lake, Utah, where he now is, that at De Lamar's Bully Hill mines and smelter at intervals bullion of the value of \$500,000 is stacked up at the plant. A new strike recently made in unexplored territory through a new opening from the surface discloses a remarkable ore body, some of the ore containing a valuation of \$5000 per ton in silver and gold. Mr. Mitchell says the output of three months at the mine and smelter was such as to reimburse De Lamar for all he was out in the acquisition of the group, for which he paid \$265,000.

Forty-three mining location notices were filed with the Shasta county recorder in September.

J. J. Chambers will put a smelter on the Afterthought property.

The break in stocks makes Trinity quoted at 11.

The McCloud River Electric Power Co. has let a contract for preparatory work on a 15,000 H. P. plant to the San Francisco Construction Co. and G. W. Elder of San Francisco.

H. H. Noble of the Northern California Power Co. says he will build a third power plant on Pitt river to develop about 200,000 H. P., the power to be transmitted to San Francisco 260 miles.

At Keswick the smelter is running full capacity. At the beginning of the year two furnaces were in operation, but a third one was started last week. There is ore in storage to keep a fourth going. Two of the three briquetting machines are in constant operation.

The Salt Lake Tribune of the 28th ult., says \$20,000 paid to A. H. Tarbet relinquished his property rights in the Afterthought group of mines, the property upon the payment of \$150,000 to pass to W. F. Snyder of Salt Lake City. The Western Exploration Co., of which Mr. Snyder is president and manager, has an option on the Balakala group in the same locality, and the purchase of the Afterthought indicates the option on the neighboring proposition, which involves \$650,000, will be exercised. A condition of the deal requires continuous work until the final payment on the Afterthought is discharged. The property has already been extensively opened up with good results.

According to local reports, the Afterthought copper mine, 20 miles from Redding, is bought by the Great Western G. Co. from the Tarbet Syndicate of Salt Lake City, Utah, for \$150,000—\$20,000 cash, the remaining \$130,000 in one year.

SIERRA COUNTY.

Work is resumed on the Mabel Mertz mine, above Alleghany, by H. McCormick.

R. Phelan is operating mining property in Slug canyon and has a bond on the Butte Saddle property, Sierra City, fourteen men being employed there.

Parrington, McCree & Bacon of Salt Lake City, Utah, have been examining the Mexican ledge on the South Fork, bonded to a company represented by H. M. Bacon.

SISKIYOU COUNTY.

John C. Young of Baker City, Or., is interested in the Hummer mine, East Fork district, 6 miles from Callabans. The capping of the Hummer is gossan rock, the vein below a quartz with iron sulphides, but no copper. The workings are shafts and crosscuts. Ore near the porphyry contact gives a return of 10% copper.

The Phillips Arrastra M. Co. at Seiad has tunneled over 80 feet into the mine,

which shows ore the entire distance. They will sink a shaft on the vein, which is 5 feet across. The company has a quartz mill on Seiad creek. The ore has yielded \$24 per ton.

TUOLUMNE COUNTY.

(Special Correspondence).—The Mack Con. G. M. Co. has bonded all its property here to L. H. Carver of San Francisco. There is an equipment consisting of a 10-stamp mill, compressor, holsts, boilers and engines, pumps, tools. Considerable development work has been done on a vein averaging 5 feet in width, disclosing the existence of two ore bodies that carry good values. The Mack shaft is down 400 feet and the Wooten 300 feet, both of which are double compartment, sunk on the vein at an inclination of 35°. Mr. Carver will direct future development.

Big Oak Flat, Sept. 25.

The Jamestown Magnet says at the Eagle-Shawmut mine ninety men are kept to work during the shut down. The chlorination plant is being run to its full capacity. Removing the forty stamps from the old mill to the new is about completed and in a few weeks time 100 stamps will be dropping regularly at the Shawmut mill.

Near Tuttle town the Tarantula mine is being dismantled, the machinery to be removed to the Last Chance mine at Angels.

The Santa Ysabel G. M. Co. of Boston, at Quartz, will reorganize with a capital stock of \$2,000,000; present capital, \$750,000.

At Confidence S. A. Addison will add to the cyanide plant so as to enable it to run all winter. Fifteen more men will be required.

The Sonora Union-Democrat says the forty stamps from the old mill are being removed and set in place alongside the sixty in the new building at the Eagle-Shawmut mine. The 100 stamps will be dropping before the close of October.

The cyanide plant at the Mt. Jefferson is in operation and gives satisfaction. Heretofore the sulphurets were handled at a great cost, which was only possible owing to their rich character. In shipping them away for treatment it cost the company \$19.50 for every ton treated, while now with the mine plant a ton can be treated for \$2.50—a saving of \$17 on the ton.

W. Tucker, superintendent Stockton Gravel M. Co. near Jupiter, has a new saw mill, capacity 10,000 feet. A crosscut saw has been added to the equipment. A third pipe line is being put in and another monitor will be installed. A blast will be set off in November in the old works—two tons black powder in one shot.

Superintendent J. H. Burkhart will put in a new 10-stamp mill at the Mt. Hood.

Near Carters, E. C. Holmes has bonded the Great Wonder and New Century mines at \$10,000.

TRINITY COUNTY.

The Journal reports that, on Bullychoop mountain, the Bullychoop M. Co. has completed its new works. The towers for the gravity tramway are in position and ready for equipment. The mill and mill buildings will be completed next week. The company expects to start up the mine Oct. 10th. Twenty-five men are employed, to be increased to sixty when the mill is ready to crush ore. The ledge is over 20 feet in width, of low grade and well mineralized. During the year before the mill was moved the mine paid dividends. The removal of the mill to its present position and other improvements made will facilitate the working of the mine and will cheapen the cost. The tramway alone will effect a saving of 75 cents a ton in handling rock. W. B. Gester is superintendent and A. P. Anderson foreman.

The Texas Jack mine, Edmonds & Subbett owners, has a stamp mill.

At the Oriole mine, owned by Collins Bros. & Paulsen, the ore is crushed in a cannon ball mill.

The Enterprise mine at East Fork is developed by 3500 feet of levels, dips and winzes. The pay shoot in the Lone Jack is 30 inches wide—\$10 to the ton in gold. The pay shoot in the Enterprise averages \$50 in gold per ton. The property has a 10-stamp mill and a tramway uniting the mine and mill. The mill run for July was seventy-four tons and the result a gold bar worth \$839.63. In August twenty-one tons were run through the mill and a gold bar worth \$613.99 was the result. A new pump and hoist are to be installed. The Spokane purchasers are Hays & Stevens.

COLORADO.

BOULDER COUNTY.

The Boulder County mine, at Cardnal, has run steadily since June, 1901. Twenty men are employed, mostly on development work, doing little stoping. The mill is treating 600 tons a month—a 30-stamp

rapid drop mill. The management has postponed enlargement of the mill until spring; will then double its capacity.

CHAFFEE COUNTY.

A deal has been made by the Colorado Securities Co. by which Missouri men acquire ninety-two acres mineral land in Granite district.

CLEAR CREEK COUNTY.

Idaho Springs reports that Judge Clifford of Chicago on petition of C. E. Dickson of Jacksonville, Ill., has appointed the Merchants' Loan & Trust Co. as receiver for the Con. Stanley M. Co., owning the Stanley property at that place.

Georgetown reports the Vidler tunnel attracting attention. It has cut a vein 225 feet from the entrance sealed with streaks of galena and gray copper. The tunnel, within 7000 feet, will cut through the Continental divide.

The Empire Tunnel Co. has the tunnel in 1400 feet. Last week a vein was cut carrying \$8.80 gold per ton. The company owns the Gold Dirt property and has thirty men at work repairing, altering and extending the workings. Milling ore is blocked out, through which run streaks of milling ore.

Shipments from the Gold Fissure average 1000 tons per month, being the usual output. This ore is shipped to the Carpenter smelter at Golden and averages about \$11 per ton. Thirty men are employed.

On Bellvue Mt. the Poorman group of twelve claims is being worked by an Eastern company, A. I. Bean superintendent, who is cutting a station 190 feet in the tunnel for a 22 H. P. gasoline hoist. The shaft will be sunk to a depth of 300 feet. The company will start a tunnel from the Clear creek side, near Dumont, driving on the vein, and in a distance of 1200 feet will attain a depth of 800 feet on the Poorman vein.

The mills of Idaho Springs district are in operation to their full capacity. The Jackson mill is running on ore from the Old Town mine, Russell Gulch; the Newton mill on ore from the Gem vein, Newhouse tunnel, and Main Trunk, Kansas-Burroughs and Gower Syndicate of Gilpin county; the Bonieta mill on ore from the Quito and Fraction mines and the Eagle Bird mine at Yankee Hill; the Bertha mill has ore from the Lillian, Waltham and Old Town mines in Russell district; the Gold Cord mill on ore from the Newton and General Thomas mines; it is operated under lease by the Little Mattie Co., who are also operating the Mattie mill at full capacity. At the Wilkie mill ore from the Boodle mine, Gilpin county, and the Seaton, Silver Age and Sun and Moon mines is being crushed.

FREMONT COUNTY.

J. Stovekin, manager Cripple Creek beam mill at Florence, talks of a new mill between Colorado Springs and Cripple Creek, on the line of the Short Line Railroad. He has applied for a patent for 160 acres of land and says he will erect a mill that will be able to treat \$5 ore at a profit.

GILPIN COUNTY.

Superintendent J. Neidmeyer has seventy-five men at the Gunnell and Grand Army mines; average daily shipments, eight tons, most of which goes to the mills of the company at Black Hawk.

The Boston & Denver Con. M. & M. Co. afford employment to fifty men, all of whom are working on tribute account. About 100 tons of ore are daily taken out and treated in the big mill, which is also handling some custom ore.

Operations are resumed at the P. K. and Bant mines, east of Black Hawk, under the management of G. D. Johnstone.

GUNNISON COUNTY.

The Goodhope mine, at Vulcan, is in more ore. There are five levels running from the main shaft, all in ore. Shipments have been small, averaging \$15,000 per month. The shipping ore from the Goodhope is running \$200 per ton.

HINSDALE COUNTY.

J. D. Brown is superintendent California mine, below Henson. An air compressor is in; a 6-foot vein carries silver, lead and from \$2 to \$5 per ton gold. He expects to build a mill next spring.

Near Bonanza, J. D. Baldwin is superintendent of the Rawley, one of the largest producers in camp. A concentrating plant is going in and will be in running order May 1, 1903.

The Juretta is working two shifts. Superintendent Ashley has assays as high as 250 ounces silver.

Manager J. MacMillan of the Little Sister M. Co. has a group of claims in the heart of Bonanza's mineral belt.

LAKE COUNTY.

Near Leadville the Moyer is shipping 250 tons of ore daily. This has to be hand-sorted before it goes to the smelter. The ore is varied, containing iron, zinc, copper

and lead, some straight iron sulphide which goes straight to the cars, the balance is sorted out by miners. The lessees of the Moyer are putting down a new shaft that will reach the lower contact at a depth of 1000 feet.

There is now coming out of the Yak tunnel 200 tons per day of sulphide ore and zinc, including the tonnage of the company and that of the lessees.

A car of ore from the Washington mine of the Washington G. M. Co. at Granite, near Leadville, returned 6.38 ounces gold and 4.05 ounces silver, for the high grade, and 2.18 ounces gold and 1.02 ounce silver for the medium-grade ore. The consignment was made up of ore extracted from the 118 and 175-foot levels from the high-grade streaks in big vein, which is 25 feet wide. Leaving out the rich streaks the vein averages \$7 to the ton.

Manager Guth of the Banker mine has returned to Leadville from New York to resume work on the mine, sink the shaft and do prospect work in the low-grade ore bodies. He is considering the erection of a milling plant to treat this low-grade ore.

MESA COUNTY.

A uranium plant of ten tons capacity per day is to be erected at Grand Junction by C. E. Carpenter of Cincinnati.

MINERAL COUNTY.

Ore shipments from Creede during August were the largest of any month this year, amounting to over 7000 tons. Up to Sept. 20 they aggregated 4764 tons, requiring 238 cars for conveyance to market.

OURAY COUNTY.

In the Tabasco mines, Burrows park, the main tunnel, 1265 feet in length, runs alongside the vein, going clear through the mountain. The vein has been cross-cut in ten places along the tunnel. Its width is from 7 to 30 feet, the average width being about 20 feet. A number of mill runs from these cuts give an average of \$11.20 per ton. The mill, located 2 miles from the mine, is ready to start, but the connecting tramway is not quite finished. The capacity of the mill is about 100 tons per day. When in full operation, the company expects to clear \$1000 a day over all expenses. The Iselde mine is operated by the Dupre Co. The ore body is 2 to 6 feet wide; the output is half a carload daily. Some ore comes out of the mine running 100 ounces gold to the ton.

The Brooklyn mine, near Chattanooga, is to have a 10-stamp mill. The low-grade ore will be handled on the ground, the richer material going to the Durango smelter. About three cars are shipped each week, containing three ounces gold and some silver.

Superintendent G. T. Bradley, near Ouray, has the Pickett mine, Poughkeepsie gulch, in preparation.

The Des Ouray Con. has incorporated in Montrose to work the Republican, Virginia Bell and about twenty-five other claims on Mineral creek.

PUEBLO COUNTY.

At Pueblo the Philadelphia smelter has made an additional order for 120 tons of Ilmorock per day from the quarries west of the city.

The oil refinery at Overton will be dismantled and the machinery taken to Boulder, where it will be used in an oil refinery to be established at that place. The refinery has not been used for several years. It was built to refine the oil from the Florence field, which was conveyed there by an immense pipe line. The original cost of the plant was several hundred thousand dollars.

Pueblo reports A. Raht of the American S. & R. Co. is in that city with S. Gugenheim. It is understood by the local management of the American smelter that the visit is to make plans by which a new smelter will be erected on a tract near by.

SAN JUAN COUNTY.

The Silverton Miner says an effort is being made to consolidate about a dozen of the best properties at Red mountain into one large company. Some Eastern men are on the ground trying to buy the different mines desired, and if successful they will be extensively developed.

The mine operators of San Juan county have organized a miners' employment agency where good practical miners can secure employment in the properties represented in the membership of the association.

The sale is reported of the Titusville group on Kendall mountain to the Guggenheim Exploration Co. for \$500,000. The property was owned by T. H. Kane and W. J. Kane and the Eastern stockholders of the Hercules M. Co.

Near Silverton, M. & W. Moyle have transferred the Gladstone, on Sultan mountain, to the Silverton M. Co. for \$20,000.

The Good Hope mine, Bear creek, reports a strike of tellurium.

SAN MIGUEL COUNTY.

The Smuggler-Union mills at Pandora are daily crushing 500 tons of ore. The company is employing 450 men at the various mines and mills; eighty men are employed at the Contention mine in Bear Creek basin; the long tramway from the mine to the mills runs steadily. The company is daily shipping from three to four cars of concentrates; the principal gold values are saved on the plates by amalgamation.

The stub tram, from the upper terminal of the long tramway to the mouth of the tunnel at the Liberty mine is completed and working. When buckets loaded with powder, timber or other mining material reach the upper terminal they are shifted on the stub and the supplies delivered direct to the mine. The mill is running at full capacity and both the canvas table and cyanide plants are treating tailings. Three hundred tons of ore are sent to the mill every twenty-four hours, and an average of seven cars of concentrates are sent to the smelter per week.

SUMMIT COUNTY.

The Pennsylvania property, Peru district, near Argentine, is sold to the Ohio Mines Syndicate, known as the Plata-y-Oro M. Co. F. Graham has managed the property, employing twenty-five men.

TELLER COUNTY.

The men who staked the late W. S. Stratton are now being heard from in great numbers, being even more numerous than those who staked the late Jno. W. Mackay.

A surface strike on the Nil Desperandum of the Gould Con. Co. shows \$100 ore in a 12-foot shaft.

Beginning Oct. 1, the following are the freight rates between Colorado Springs and the Cripple Creek district:

Ores and concentrates (minimum weight 24,000 pounds per car), actual value not exceeding \$30 per ton of 2000 pounds.....	\$2 50
Actual value over \$30 per ton, but not exceeding \$100 per ton of 2000 pounds.....	3 50
Actual value over \$100 per ton, but not exceeding \$150 per ton of 2000 pounds.....	4 50
Actual value over \$150, but not exceeding \$200 per ton of 2000 pounds.....	5 50
Actual value over \$200, but not exceeding \$300 per ton of 2000 pounds.....	6 50
Actual value over \$300 per ton of 2000 pounds if released to that figure and so specified on bill of lading.....	6 50
Actual value over \$300 per ton of 2000 pounds and not released to that figure.....	6 50+
One per cent of value in excess of \$300 per ton	
When smelters will not issue and furnish to delivering agent a certificate showing actual value, and where the ore is not released in accordance with second preceding clause.....	9 50
Actual values not exceeding \$20 per ton of 2000 pounds.....	1 00
Actual value over \$20, but not exceeding \$25 per ton of 2000 pounds.....	1 25
Actual value over \$25, but not exceeding \$30 per ton of 2000 pounds.....	1 50
Actual value over \$30, but not exceeding \$40 per ton of 2000 pounds.....	2 00
Actual value over \$40 per ton of 2000 pounds.....	2 50

Ores and concentrates, less than carloads, shipments will be charged for at fourth-class rates per 100 pounds. All charges must be prepaid.

The Cripple Creek M. Co. has stopped sinking at the 1100-foot point and is cutting a station at that level of the Hull City placer. The leasing company is gradually decreasing shipments. Twenty-five tons a day is now being produced, chiefly from the 1000-foot level. The ore is averaging \$50 per ton. A connection is being made between the Glorietta workings and the main shaft at a depth of 785 feet in the latter workings.

The continuation of the Anaconda ore shoot has been opened 10 feet below the tunnel level, in block 42, by E. Peterson. The ore shoot is 8 feet in width and samples \$30 to the ton.

H. L. Coe is manager Squaw Mountain M. & M. Co. and has a contract to operate their April Fool claim from the 660-foot level of the Goconda mine. The vein matter averages \$11.20 to the ton in gold.

The new double hoist on the Zenobia is in operation. The 200, 300, 400 and 500-foot levels are being extended to exploit the territory, and sinking has been resumed and will be continued to a depth of 1400 feet.

The Mary McKinney mine pulled its pumps last week, allowing the sixth level workings to be submerged. This action is taken in view of the fact that it will be several months before the new 1500-gallon-a-minute pump arrives, so that it is inadvisable to keep pumping 300 gallons a minute when there is nothing being done

in this level. The shaft was sunk to 600 feet some time ago and a station cut, which was later enlarged to accommodate the new big pump when it should arrive. The pump may not be received before Jan. 1, so that there would elapse three months of needless pumping, and the object which would be gained would be nothing more than keeping the station at 600 feet clear of water.

Cripple Creek says work on a big scale is to be resumed on the Newell tunnel, Grouse mountain, fifty men to exploit the vast ground. The work so far performed has cost \$100,000. Manager Newell says he is prepared to go ahead and spend another \$100,000, if necessary. The main tunnel is in 1400 feet. A lateral has been extended north a distance of 1100 feet, and from it has been sunk a winze to the depth of 110 feet. It is the intention to deepen the winze down to the 500-foot point below the tunnel.

Eight of the fifteen companies owning property on Guyot hill are under operation. There are employed on the mountain 181 men, who receive on an average of \$3.32 per day, making a daily payroll for the hill of \$600. The largest force is employed by the Mary McKinney Co., it having 120 men on its payroll, who average \$3.50 per day.

What is locally believed to be the continuation of the Anaconda ore shoot has been opened 10 feet below the tunnel level on block 42 of the Anaconda estate.

Thirty men are sorting and washing the dump of the Elktion mine. Considerable low-grade ore is being shipped weekly from the dump; most of it will average \$15 to the ton.

A proposition that receives attention from mining men on the watersituation of the Cripple Creek district is driving a tunnel from below Grouse mountain toward the El Paso mine, connecting with the 600-foot level in that property.

London dispatches of the 1st say that the Venture Corporation, promoter of the Independence mine at Cripple Creek, confirms the report from Colorado Springs that it is preparing to bring suit for \$5,000,000 damages against the estate of W. S. Stratton. Mr. Baker, managing director of the Venture Corporation, is now in the United States and is said to be preparing the necessary evidence.

Work has been resumed on all of the properties owned by the Stratton's Cripple Creek M. & D. Co. throughout the camp. Superintendent Johnson is in charge.

In Cripple Creek district, on Battle mountain, there are seventeen properties under operation, either on company account or by lessee; employed by them is a total of 1682 men. The average pay for each man is \$3.50 per day—\$176,400 a month. The territory of Battle mountain is owned by a total of twenty-eight companies and of that number about two-thirds are under operation. The Portland has 490 employees; Stratton's Independence has 400 men; the Ajax 200 men; the Gold Coin 150 men; the Granite 92 men; the Strong 80 men; the Ophir Co. 50 men; the Modoc Co. 45 men; it is expected that that number will be doubled when it starts work through the new shaft. Gray & Kurtz, operating the Monument, have twenty-five men; on the St. Patrick property, seventeen men; the Sunset-Eclipse, twelve men; ten on the Mary Cashen; on the Monument, Dillon, Coriolanus and Mary Alice, twenty men.

The men on the Portland are breaking about 9000 tons of ore a month. On the Ajax, 3000 tons of ore is broken and shipped each month. On Stratton's Independence a tonnage of 300 tons of ore a day is shipped. The Gold Coin is daily averaging sixty tons of ore. Gray & Kurtz, operating the Monument, are shipping thirty tons of ore a day that will average \$40 to the ton. The Strong averages three broad gauge carloads of ore each day. The Modoc is not shipping heavily at present. A good ore body is at the depth of 425 feet on the Mary Cashen. The Mohican is making regular shipments. The Ophir Co. shaft is down 600 feet and to be sent to the 1000-foot point.

The public dividends paid amount to \$10,940,524. Of this the Portland distributed \$4,267,080; Stratton's Independence, \$3,558,000; the Gold Coin paid \$1,160,000; the Strong, \$1,615,000; the Modoc, \$310,000; the Monument, \$30,444.

Men familiar with the underground workings estimate that there is enough ore in sight to mine for the next five or six years.

IDAHO.

ADA COUNTY.

J. W. Burton, manager Gold Eagle mine, Boise, Idaho, continues the incline to the 300-foot level, 80 feet below the present sump at the bottom of which he reports ore of fine quality.

CUSTER COUNTY.

The dredger at Stanley is being repaired.

The management says the boat will have to be enlarged before dredging operations can be resumed.

A bond has been given on the Mountain Girl group of mines to W. J. Bryan, who projects a 20-stamp mill.

Grading for the new mill at the Valley Creek mine is finished.

There was a recent trial run of one of the smelting furnaces at Mackay. The equipment may have to be changed. Only one stack was blown in. The hauling capacity will therefore have to be increased. The two furnaces have a daily capacity of 1000 tons ore. Automatic bins may have to be put in.

SHOSHONE COUNTY.

The following reduced rates for the Cœur d'Alenes on lead concentrates and ore, graded on previous scale of values, took effect Sept. 22, 1902: Denver & Pueblo, \$8, \$10 and \$12 per ton; Leadville, \$7, \$9 and \$11; East Helena, \$2.75, \$4 and \$6.

The Marietta G. M. Co. has secured control of the Atlas group of claims in the Cœur d'Alenes. The company paid \$10,000 for the property and announces that work will be started at once to develop the property.

The town of Delta, one of the oldest mining camps in the Cœur d'Alenes, will soon be no more. Every strike on the town site is to be torn down, burned or moved away. The town site has been purchased by the Beaver Creek G. M. Co., which will dredge that portion of the creek.

After four years of litigation the Skookum mine case has been settled. K. J. Hanley, plaintiff, has been awarded damages to the extent of \$265,241 by the master in chancery at Spokane. The Skookum mine is in the vicinity of Wardner. The defendant was the Empire-State Idaho M. Co. The court held that during the four years of litigation the defendants had extracted ores from the Skookum grounds to the extent of \$4,354,957.

Mullan reports a copper strike on the property of the Park C. & G. M. Co., Steven's peak, 5 miles south of there. The owners of the property say the vein is 10 feet wide. It is said the ore will carry 26% copper. The directors of the company are Samuel, Burke, Gies and Bernard, all of Wallace.

Wallace says the Northwestern S. & M. plant, 1 mile west of there, has been sold by the Mine Owners' Association to the American S. & R. Co., to be turned over Oct. 1. The plant has been established twelve years. All the ore produced from the mines of this district is sampled at the plant before it is shipped to the refinery. Until May last the plant was owned by Potter & Whitlow, when it was purchased by the Association.

MICHIGAN.

HOUGHTON COUNTY.

Houghton reports the Adventure mill in commission, with one head of stamps in operation. One feature of the new mill is the use of two Huntington mills for the regrounding of raggings or coarse sands. From these mills the material goes to Overstrom tables for treatment. The pump is a four-section Reidler compound, the first to be used at a Lake mill.

Calumet estimates that about 4,000,000 tons of ore will have been shipped from the port of Superior by the close of the present season. All the copper ore ports have been heavy shippers and ore carriers are now waiting at some of the lower ports. The indications are that the rush will continue up to the close of navigation. It is estimated that the shipments for the first half of September will be equal to those of the same period of last year, when a record was made. It is said that the Calumet & Hecla mine will have shipped enough mineral by the close of navigation to keep its smelters at Buffalo in operation until next season. The indications are now that, owing to the increased production, next season will see the heaviest movement of copper ever recorded from lake ports.

MONTANA.

BEAVERHEAD COUNTY.

J. M. Humes of Butte has charge of development work in the placers of French gulch.

FERGUS COUNTY.

Murphy Bros. are operating a mine in the Cone Butte district, close to the Golden Eagle group, a cyanide proposition.

Hoisting machinery has been placed on the property of the New Syndicate Sapphir M. Co., Yogo. The season's work is reported satisfactory.

The mill at Kendall is crushing 300 tons of ore daily. The bulk of the ore comes from the west cut, 75 feet wide and 100 feet deep. The new shaft is down 250 feet, where drifting goes on. The company's refinery is ready for work.

FLATHEAD COUNTY.

With the drills operated by the Ameri-

can Kootenai M. Co., near Libby, 47 feet of holes were drilled in one shift of eight consecutive hours, including the time consumed in taking and setting up drill from one tunnel to another, which takes about one hour. Their mill has been started up.

GRANITE COUNTY.

F. D. Brown is manager the Henderson M. Co. at Sunrise. Eighty men are now employed. The mill is dropping twenty stamps crushing ore from the Queen and Bunker Hill mines. E. C. McCool is mill foreman, T. Botschelder mine foreman.

The Sunrise mill and concentrator, near Philipsburg, are in operation, the concentrator handling fifty tons of ore. The ore comes from the Bunker Hill mine, half a mile from the mill. All the claims in the district are reported practically controlled by the Henderson M. Co., which succeeds the Sunrise M. & M. Co. About fifty men are employed; F. D. Brown manager, C. C. Spencer superintendent.

L. U. Loomis is manager at Gold Creek where the Gladstone G. M. Co. is operating. The company has control of the Gladstone group of mines and has twenty-seven men employed. Excavation is completed. The company has built 4000 feet of flume and dug 4000 feet of ditch. A bedrock dam of cement and concrete has been built, collecting all the waters of the west fork of Blum creek. This furnishes 75,000 gallons per day. The mill is thirty tons capacity and treats the ore by the cyanide process. It is calculated that the ore can be mined and milled for \$4 per ton.

LEWIS AND CLARKE COUNTY.

The Twilight mine at Unionville, south of Helena, has been bonded by Butte men.

MADISON COUNTY.

The Gold Hill mine, near Parrot, is under option to F. A. Heinze and associates of Butte; consideration said to be \$40,000.

Minneapolis men have bought the Galena mine at Sterling for \$60,000. The Galena is a good producer and has been a profitable mine. Ore worth \$100 per ton is now on the dump. An inclined shaft comprises the principal development at present; deepest level only 225 feet.

The Fairweather M. Co. of Minneapolis which has a bond on the U. S. Grant mine, near Virginia City, say operations will be resumed October 10.

Casals reports a landslide which totally destroyed the hydraulic plant, including flumes, sluices, monitors, etc., of Thibert Creek M. Co., which cost the company \$60,000. The men who were at work had a narrow escape from death. The company was getting ready for the season's clean-up; besides losing their valuable plant, they also lost their season's work.

PARK COUNTY.

Livingston reports the probability of a big smelter to be installed at that point.

NEVADA.

To illustrate the present mining activity in Nevada is appended a list of one week's incorporations at the capital:

Home Run M. Co., \$80,000, Tonopah.

Salt Lake & Reno M. & M. Co., \$600,000, Reno.

Alpine Placer G. M. Co., \$100,000, Reno.

Yankee Blade M. Co., \$100,000, Tonopah.

Oro Flno M. Co., \$75,000, Reno.

M., F. & I. Co., Ltd., \$400,000, Reno.

CHURCHILL COUNTY.

Shipping borax from the mines at Cottonwood to Winnemucca has begun.

ELKO COUNTY.

D. A. Herron, general manager of the Lucky Girl mines, near White Rock, says he is operating a 20-stamp mill on the property and regular shipments are being made. About seventy-five men are employed in the mine and mill. The property is owned by a Marysville, Montana, company, who were proprietors of the Drummond mines in Montana.

LANDER COUNTY.

The gold and copper mine at Iron Canyon, sold last year to Eastern men, and subsequently resold to Pettigrew, Hyde & Fox, for \$75,000, is being developed and good ore extracted.

LINCOLN COUNTY.

A new hoist is going in on the Rio Vista claim of the New Era property. The New Era Co. will put in a pumping plant at the Boland well, and will pump the water to the Rio Vista; 6500 feet of pipe will be required.

Pioche says an assay from a picked sample from the Pioche mine, at Silver King, gave 8050 ounces silver. West, McGee & Wheatley will sack the rich ore.

A. Murphy is superintending work on the properties of the E. & F. Co. He tells the Tribune the ore from the new discovery at Silver King, 40 miles north of Pioche, spoken of last week, is a sulphide of silver and verifies all that has been claimed concerning its richness. He says the ledge has now been opened up for a

distance of 50 feet along the surface, the high-grade occurring in chambers and promising the means with which to continue development.

NYE COUNTY.

Tonopah will have water in the near future for milling, fire and domestic purposes. Rodgers & Adams of the Tonopah Water & Power Co., have bought 50 inches of water in Twin river for \$10,000. The company also has an option on other holdings on the river and the remaining water rights, and if the company take the same, are to pay an additional \$15,000. The company has completed a survey of the proposed line, 60 miles in length, from where the water will enter the 12-inch pipe to the reservoir in Tonopah.

Sodaville hears of a strike in the Tonopah Fraction in shaft No. 2 at 330 feet, measuring 7x17 feet.

S. T. Pearson, general manager of the Nevada Co. at Berlin, is milling an average of seventy-five tons of ore daily. Nearly 150 persons are afforded employment.

At Tonopah W. B. Sollender will put a 34 H. P. engine and hoist on the Gold Hill Extension claims, on which a double-compartment, all-timbered shaft has been sunk 75 feet. It is the intention to sink 500 feet before crosscutting.

WASHOE COUNTY.

The Pyramid Lake M. & M. Co. has opened bids to upraise a three-compartment shaft from the second level of the inclined shaft to the surface and to continue the shaft downward another 100 feet. There were four bids, ranging from \$3000 to \$8500. The contract was let to F. O. Norton. Work on the shaft will begin at once.

M. Scheeline has bought the sulphur mine near Steamboat Springs.

G. Wedekind, discoverer of the mine of that name north of Reno, says, while eating his lunch one day, he noticed a yellowish float rock that he thought was ore, and he gathered up one or more pieces and sent them to his son-in-law at Cortez for assay. After several weeks he learned that the ore assayed \$1400 to the ton. He followed the float up the hill and within 100 feet found the Wedekind mine.

WHITE PINE COUNTY.

The Rocco-Homestake mine reports an ore vein 8 feet high and 4 feet thick assaying \$40 per ton in lead, silver and gold.

NEW MEXICO.

GRANT COUNTY.

Because of high smelter charges the Aberdeen Copper Co. will erect its own plant at Lordsburg. Plans and specifications for a lead smelter of 100 tons daily capacity are drawn. It is expected to have it in working order Feb. 1, 1903. The company is running its concentration plant eight hours a day, all that can be done with the limited water supply.

OREGON.

BAKER COUNTY.

Near Sumpter, Superintendent Walker has begun work on the California concentrating plant. Coarse crushing Cornish rolls will be followed by jigs, where the Baker City says a Chinese who has leased the Salmon creek placer mines found a gold nugget worth \$15,000, the largest nugget ever discovered in Oregon. heavier pieces will be separated and saved. An aerial tramway 2800 feet long will be built from Blacksmith tunnel to the mill.

MALHEUR COUNTY.

F. J. Melkle says a 20-stamp mill will be put up on the Black Eagle mine, of which he is the principal owner and manager. It is low grade, averaging \$3 per ton; ledge is 250 feet wide and easily worked. They have water power to run a 100-stamp mill.

SOUTH DAKOTA.

LAWRENCE COUNTY.

The new purchase of the Baltimore & Deadwood cyanide mill, on Deadwood creek, at the mouth of Blacktail, will be put to work reducing Columbus ore. On the northerly end of the property various upraises and crossdrifts have been made in the siliceous ore body, running \$20.

The Homestake has six mills, with an aggregate of 900 stamps, reducing 3600 tons every day, turning out \$18,000 daily.

The strike of the Hidden Fortune Co., in prospecting by drill for the continuation of the Grantz shoot, has been extended the present week over a further area. The company will sink a shaft to mine and raise the ore from the new development on the Bingham. A grade 100x600 feet is being excavated for the shaft, 500 feet southwesterly from the entrance to the Baltic tunnel. Superintendent Steel is grading for delivery of lumber for the shafthouse.

The Pluma M. Co. feel encouraged by late developments in the shaft it is sinking on its property, and by a recent mill run of ore in the old Pluma stamp mill,

showing the ore to carry \$5.42 per ton. It can mine and mill its ore with a mill capacity capable of handling 150 tons per day, for \$2 per ton, and has the property of the Hawkeye Co., together with its 40-stamp mill, situated at Pluma, and the aerial tramway connecting the mine with the mill for transportation of ore. The Pluma shaft is down 310 feet. Superintendent Ellison has installed the 12 drill compressor and is operating machine drills.

At Cyanide the Gold Edge Co. has siliceous ore in the main shaft at a depth of 300 feet. Superintendent Goodman thinks he is near the lower quartzite, and should large bodies of ore be cut on that level, it will stimulate deep mining throughout the whole of Ragged Top and Squaw Creek district.

T. J. Grier, manager Homestake M. Co., is locally credited with the statement that the company is preparing to construct a large stamp mill—not less than 400 stamps under one roof, and, possibly, 600—which will necessitate an auxiliary cyanide plant equal in capacity to those now in operation at Lead or Gayville.

The Searfish G. M. Co., Ragged Top district, is producing 6000 tons per month. All ore taken from the property is treated at their own mill. The gold is sent to the Government assay office at Deadwood. During August two bricks returned nearly \$24,000. The last brick sent out was 927 fine.

At Central City the shafthouse at the new Bingham shaft of the Hidden Fortune Co. is building. The old Golden Crown mill will be moved to this site and thus utilized.

At the Otto Grantz the company is drilling two new holes a day; the claim proves continuous, running from \$8 to \$200.

Lead says Chicago men are interested in the Anaconda G. M. Co., which owns 400 acres between Bear Butte and Elk creeks, 1½ mile west of the Uncle Sam mine of the Clover Leaf M. Co. The group is cut by four free milling ledges. Assays as high as \$88 a ton have been obtained. The general average is \$8 a ton. An order will be placed for a steam hoisting and pumping plant.

The last annual report of the Homestake Co.'s operations shows that the Homestake produced in bullion \$4,303,917.57 for the year ending June 1, 1902, against \$3,639,332.03 for the year ending June 1, 1901. The six stamp mills of the company produced 241,207.96 ounces of bullion, gross, worth \$3,747,406.14 in gold and \$28,496.74 in silver. Mint charges against this amounted to \$10,081.55, which left \$3,765,823.33. The cyanide plant at Lead, operated on tailings, produced twenty-five bars of bullion, valued at \$537,723.77. The proceeds of concentrates amounted to \$430.45.

The different mills of the company reduced during the year 1,218,089 tons of ore. Of this the Homestake mill reduced 287,134 tons; the Golden Star, 288,319; Amicus, 193,015; Deadwood-Terra, 169,435; Monroe, 139,200; Mineral Point, 83,705; Pocahontas, 57,290. The monthly average of ore milled has been 101,507 tons, or about 3850 tons a day. This ore has yielded \$3.53 a ton net. The monthly cleanups at the stamp mills have amounted to \$314,658.74 on an average, and the cyanide plant has yielded a monthly average of \$44,810.31. The financial report of the secretary furnishes some interesting figures. Among the receipts, in addition to the bullion amount, are shown bills payable, \$300,000; proceeds of sale of Black Hills & Fort Pierre Railroad to the C. B. & Q., \$1,000,000; balance of cash transferred, \$91,037.40; new capital stock issued, 8400 shares at \$75 a share, \$630,000. With numerous minor items and various balances the receipts are brought up to \$6,617,910.63. Incident to the operations of the different mills and mines the following disbursements have been made: Amicus mill, \$94,086.09; bullion freight, \$6298.50; B. & M. shaft, \$115,950.34; cyanide, \$202,483.48; cyanide construction No. 2, \$127,915.46; dividends for the year, \$1,260,000; Ellison shaft, \$21,753.12; general and legal expense account, \$27,490.59; Golden Star shaft, \$26,524.61; Golden Gate shaft, \$17,331.17; Homestake mill, \$119,613.29; Deadwood-Terra mill, \$103,560.40; Mineral Point mill, \$109,303.84; Monroe mill, \$78,028.92; Pocahontas mill, \$25,044.12; property purchased, \$302,451.95; promissory notes, paid in August, 1901, \$750,000; salaries, \$20,614; stables, \$32,602.66; maintenance of superintendent's house and housekeeper, \$5,353.07; survey, \$22,182.50; tramway, \$43,007.13; taxes, \$59,506; water and increased water plant, \$379,878.58.

Superintendent T. J. Grier says: "During the past twelve months 100 stamps were added to the company's milling facilities, so that at this writing 900 stamps are dropping on ore from the mine. Three months ago the installation of a Reider pump at the 1100-foot level was completed and the pump started. The mine is now equipped with pumping facil-

ities in duplicate. The Ellison shaft was sunk 100 feet during the past few weeks—is now 900 feet deep and is being sunk further. None of the other shafts on the property have attained greater depth than was reported a year ago. A second large cyanide plant is in course of erection at the north end of the property and will start about the latter end of August on tailings from three mills containing 360 stamps there located. Preparations are in progress looking to the installation at the Ellison hoist of a large compressor, with boilers to run it, in order to supply the deficiency in air felt in operating additional drills to supply with ore the additional stamps started during the past two years."

YANKTON COUNTY.

At Gayville, Cyanide No. 2 of the Homestake is completed.

The regular employees of the Columbus Co. at the old Portland mill are engaged on the reconstruction of the mill. New batteries and new guides are being put in; the sand pump has been moved 10 feet closer to the batteries. The intention is to re-roof the engine and boiler room and paint the mill. Practically all of the force formerly employed by the Portland Co. has been retained by the Columbus Co.

UTAH.

Near St. George, C. W. Johnson of Tonopah, Nev., has bonded the Paymaster group of mines adjoining the Dixie group on the south, for one year for \$80,000. The lessee is to commence work within thirty days, install a gasoline hoist and make a road from the Paymaster dump to the Dixie Co.'s road. A shaft 300 feet deep has been sunk.

JUAB COUNTY.

Ore shipments from Tintic district for the week ending Sept. 26 were:

	Cars.
Ajax.....	1
Alaska.....	1
Bullion-Beck.....	6
Carissa.....	1
Centennial-Eureka.....	17
Dragon (iron mine).....	18
Eagle & Blue Bell.....	15
Eureka Hill.....	8
Gemini.....	6
Grand Central.....	20
Lower Mammoth.....	2
Mammoth.....	9
Yankee Con.....	6
Total.....	110

W. D. Sheppard will put a mill on the Pioneer group of gold-bearing locations, 6 miles southeast of Diamond, Tintic district.

SALT LAKE COUNTY.

(Special Correspondence).—The Garland lease on U. S. M. Co.'s property are shipping 125 tons per month.

The Columbia C. M. Co. are doing considerable development work. The drift along What Cbeer vein from the Dederich upper tunnel for 600 feet shows values of 2½% 50 feet thick. This ore concentrates readily about fifteen tons into one, making a high-grade concentrate and a saving of 80%. The company is mining fifteen tons of second class, which averages 7% copper from the Alls-Well vein, which is being milled at the old Rogers mill; in addition to this they are shipping about thirty tons of first-class ore monthly, which averages about 25% copper. The ore is shipped to the Bingham C. & G. smelter at Bingham Junction. They are also driving the Cunningham tunnel, which is expected to tap Alls-Well vein about October 15, and will give an additional depth of 170 feet on the dip. C. H. Cook is superintendent in charge.

Bingham, Sept. 26.

(Special Correspondence).—The Tintic M. & Dev. Co., operating the Yampa at Bingham, have done about 4000 feet of development work. They were closed down from April till August. The incline shaft is 700 feet deep. The upper tunnel, 1100 feet, tapped the ore about 500 feet from the surface. The lower tunnel is in something over 2100 feet, running in the foot wall. Expect to cut the ore about the middle of next month. They are furnishing air from their compressor to the York mine. W. J. Craig is superintendent.

Bingham, Sept. 26.

(Special Correspondence).—The U. S. M. Co. at Bingham canyon hope to have their tramway in operation and shipping ore over the main line by Oct. 10. The branch they expect to have completed about Nov. 1. The tramway is about 14,000 feet in length. Two hundred and fifty men will be employed when the mine is running full capacity; employing 105 at present. The tramway will have a capacity when completed of 1000 tons in ten hours. They have 1,750,000 tons of ore blocked out in the mines. The U. S. Co. are the owners of the Centennial-Eureka, Old Jordan and Galena group, Telegraph and Niagara and U. S. smelter.

At present they are permitting visitors to go through their mines.

Bingham, Sept. 27.

The Bingham Con. wants an outlet for ores in its Brooklyn group at Bingham and has in a tunnel that at 2600 feet will connect with the shaft at a depth of 850 feet. The tunnel has been driven 1500 feet and the output of the Brooklyn next year will be passing through it to the furnaces.

SUMMIT COUNTY.

J. S. Free, superintendent Park City G. & S. M. Co., will work five claims overlooking Bonanza flat.

The New York Bonanza Co. has bought the Richmond claim, adjoining the Nall-driver and the New York, at Park City, for \$5000.

W. M. Wantland has bought the Lawrence group at Park City.

Superintendent Getsch of the California tells the Park Record that he has broken down about fifteen tons of ore in the intermediate stopes that give returns of seven-tenths ounces silver, 38% lead and \$5 50 in gold. The breast in the southwest drift is about 3½ feet.

TOOELE COUNTY.

(Special Correspondence).—Everything around Stockton nearly seems to be depending on the success of the tunnel being driven by the Honorine mine. As soon as the tunnel is finished or even commences to drain the surrounding country there will undoubtedly be a great deal of development work done in the neighborhood of Stockton, as well as prospecting through the hills.

The Oregon Short Line Railroad are employing quite a force of men, grading for their new line, which will pass through the city of Stockton. They have in operation a large steam shovel, made by the Bucyrus Co. of Milwaukee, Wis. When the road is completed it will be a standard gauge track from Salt Lake City, which is now narrow gauge.

The Honorine Co. are the owners of about thirty patented claims. The property has produced about \$2,000,000 down to the water level. They undertook to sink and did sink down to about 150 feet below water level, and at this depth were obliged to handle about 2000 gallons per minute, and soon decided to abandon pumping the water, as it was very expensive. They then commenced to figure on some other scheme for handling the water in their mine, and finally decided on driving a tunnel to drain the property. The tunnel is now in over 1200 feet. All of the work is being done by hand at present, as it is all soft ground. They have machine drills ready to start as soon as needed. The tunnel was commenced on July 7 and they expect to be able to start to drain the water by March 1, which will be about 4000 feet at that time. They have an air shaft, down now 240 feet, that connects with the tunnel. The insurance on their compressor plant, which was burned July 28, has not been adjusted as yet, but as soon as it is settled they will erect a new compressor plant. The plant, which was new, was entirely destroyed by fire. They are now getting air for their shaft and tunnel from the old compressor which was installed several years ago. The plant that was burned had been in operation only a short time.

The Black Diamond mine, which is near the Honorine, is down 180 feet and it is stated they have some very fine ore. Stockton, Sept. 25.

(Special Correspondence).—The Ensign G. M. Co. here in driving their tunnel have ore in the breast that assays from \$10.33 to \$86 70 in gold per ton. The tunnel is now in 250 feet. This company have fourteen claims. The quartz and lime is cut by a porphyry dyke. This ore is alongside the porphyry dyke extending across the face of the tunnel. F. M. Bishop of Salt Lake is president of the company.

Lincoln, Sept. 26.

Manager Dederichs, in the Black Diamond, Stockton, has 3 feet of lead carbonates on the 180-foot level.

UTAH COUNTY.

At Lehi the Salt Lake City Onyx & Mining Co. has possession of the Caroline group of claims, West canyon, adjoining the May Flower group on the south, and will develop it.

The May Flower is putting in pumping machinery.

WASHINGTON.

FERRY COUNTY.

At Republic the California mine has fifty men employed.

James Cronan, superintendent Bodie mine at Bodie has men upraising and sinking from the No. 2 level. A tramway is to be built.

OKANOGAN COUNTY.

Chesaw calls attention to placer discovery in Beaver county, 6 miles south of there. Nearly all the land in that vicinity has been staked as placer. There is an abundant water supply. The yield is shot gold and reports say there is plenty of it.

WYOMING.

CARBON COUNTY.

At Grand Encampment, the New Rambler mine has been sold for \$250,000, Holmes, Holiday & Hamilton retaining an interest in the new company.

The Big Horn Copper Co. has incorporated. The property is 3 miles south of Pearl.

Manager Davis will sink 100 feet on the Grant property, north of Pearl.

At Grand Encampment the aerial tramway of the North American Copper Co. is completed. It has a capacity of 700 pounds each half minute. The cost of transporting the ore from the Ferris-Haggerty mine to the smelter at Encampment, 16 miles away, in the past has cost \$8 a ton; with the tramway the cost will be approximately 5 cents a ton per mile.

FOREIGN.

BRITISH COLUMBIA.

Rossland reports the Velvet mine for ore treated at the Northport smelter received from sixty-three tons eighty-eight ounces of gold, sixty-six ounces silver, 2900 pounds copper; net proceeds the ore specified \$2027, average \$24 42 per ton.

B. W. Layton, who has returned from Marysville, thinks it will require between \$75,000 and \$100,000 to complete the Sullivan smelter and clear up the outstanding indebtedness of the Sullivan Group Co. He asserts that the work has been mismanaged; that the company within the past year had spent \$100,000 for the construction of a smelter and has practically nothing to show for it except a lot of brick, a flume and one or two other accessories that can be utilized in the completion of the plant.

During the week ending Sept. 26 the Granby smelter treated 5300 tons of ore; total treated to date, 523,274 tons.

At Slocan the Arlington and Speculator properties, acting in concert, will erect works for the treatment of their ores. The mill will treat the contents of the entire vein.

FRANCE.

At Commeny, on the 26th ult., the National Congress of French Miners adopted a resolution, by a vote of 80 to 18, in favor of an eight-hour day, including the time occupied in descending and ascending to and from the mine at meals.

MEXICO.

Mexico has at present 231 copper mines, 252 mines of silver and copper, 93 of gold and copper, 34 of silver, lead and copper, and 29 of iron and copper, a total of 639, located in twenty-two States and two Territories. The State of Sonora leads with 142 mines, followed by Chihuahua with 109, Durango with 72, Michoacan with 72 and Zacatecas with 64. Lower California is credited with 31 mines producing copper. These include the Boleo mine and make much the greater part of the copper product of the entire country.

Commercial Paragraphs.

THE Weigle Steel Pipe Works, Denver, Colo., has a contract for a new power pipe for the Highland Mary mine and mill, Silverton, Colo., a mile of 14-inch steel-riveted pipe under a 920-foot head, and a contract for a power pipe for the Elkins M. & M. Co. at Silver Plume, Colo., 6000 feet of 22 and 20-inch steel-riveted pipe under a 250-foot head.

MR. R. J. CORY, manager of Allis-Chalmers Co., Denver office, has recently returned from Mexico. While there, Mr. Cory closed the contract for his company with the Compania Minera de Penoles for extensive additions to their large smelting plant at Mapimi. The order amounts to some 800 tons of material, consisting of the well-known Wetley roasting furnaces, air compressors, pumps, etc.

THE Commercial Oriental Expedition Co., Seattle, Wash., says it will send a steamship from Seattle on Nov. 15, 1902, on a six-months' tour of the East; purpose purely commercial; route selected with a view of enabling the representatives of American business houses to test trade and to establish permanent agencies. The lower deck of the steamship is fitted for exhibition purposes and will be electrically lighted. S. G. Simpson is president.

THE Pelton Water Wheel Co. of San Francisco reports having just closed a contract with the Vancouver Power Co., of Vancouver, B. C., covering three Pelton wheel units, with a combined capacity of 10,000 H. P. The wheels are for direct connection to electric generators; the power to be used for electric railway and manufacturing purposes in the vicinity of Vancouver. As instancing the progress of electric transmission, may be mentioned the fact that the Pelton Co. has under construction at the present time Pelton water wheels aggregating 30,000 H. P., all of which are to be used in connection with electric transmission of power.

Personal.

T. T. BAKER has returned to Butte from Pony, Mont.

E. W. PARKER of the U. S. Geological Survey is in San Francisco.

D. FALCONER is superintendent Cortez mines, Lander county, Nev.

CHARLES ALLIS has returned from the Black Hills, S. D., to Chicago, Ill.

SCOTT WHITE is treasurer Greene Con. M. Co., Cananea, Sonora, Mexico.

W. J. WHITCOMB is now superintendent Keystone M. Co., Leadville, Colo.

H. H. TODD has returned from Hite Cove, Mariposa Co., to Alameda Co., Cal.

R. E. EVANS will be professor of mining at the Nevada State University, Reno, Nev.

CHARLES BUTTERS will arrive at Virginia, Nev., from New York City next week.

L. HAGEMAN succeeds E. H. Harrington as assayer Kennedy mine, Amador county, Cal.

C. D. GALVIN, largely interested in copper, will make San Francisco his future headquarters.

BERNARD MACDONALD is reported about to move from Rossland, B. C., to Spokane, Wash.

C. H. CUTTING, manager Troy-Manhattan Copper Co. of New York, is visiting Troy, Ariz.

M. E. HILTNER goes on the 10th as chemist for the Columbus M. Co., Central City, South Dakota.

JAMES COLQUHOUN, president Arizona Copper Co., is expected from Scotland at Clifton, Ariz., this week.

T. L. HUDDLESTON, superintendent Galena King, Stockton, Utah, has returned there from Butte, Mont.

W. O. CLYMO has returned to Butte, Mont., from an inspection of mining properties in White Pine county, Nev.

H. V. CROLL, manager Allis-Chalmers Co., Salt Lake City, Utah, has recently returned there from an Eastern trip.

W. W. ROSE, superintendent Boleo copper mines, Santa Rosalia, Sonora, Mexico, has returned there from El Paso, Texas.

H. I. WILLEY has returned to Nogales, Ariz., from Campo Santo Nino, Sonora, Mexico, where is located the Yaqui Copper Co.

A. L. TUTTLE has been appointed manager of the mines at Jimulco, Coahuila, Mexico, to succeed J. S. Whyte, who died recently.

MARK R. LAMB, mill man of Los Angeles, goes to Virginia City, Nev., in connection with the Blaisdell appliance in the Butters mill.

S. A. PARNELL, former superintendent Old Dominion, Globe, Ariz., is to take the superintendency of the Trimountain, Houghton, Mich.

MANAGER W. S. RICHARDSON, Bufo M. & S. Co., Santa Rosa, Sahuaripa district, Sonora, Mexico, has returned there from San Francisco.

BENJ. VENUTI has resigned from the White Pass, Alaska, traffic department, and is now general agent for the Dawson & White Horse Navigation Co.

MARTIN J. HELLER, examining expert for J. R. De Lamar, has returned to San Francisco after a three months' trip to the Copper River district, Alaska.

J. L. BUTLER, the father and founder of Tonopah, Nev., is in San Francisco engineering a mining deal looking to the further mineral development of that section.

A. ORME has been tendered the position of general superintendent of the mines owned and controlled by C. R. Ray, scattered over Jackson and Josephine counties, Or.

C. H. MACKAY will visit Grass Valley, Cal., to see the Allison Ranch mine, and the new mill, the Mackay estate being interested with J. L. Flood in the ownership of the mine.

B. GRANVILLE, president La Calera M. Co., has gone from Nogales, Ariz., to New York. John Henderson is manager of the company's copper mines near Chahorra, Sonora, Mexico.

G. BEVERIDGE, former owner Santa Rosalia mines, Sonora, Mexico, has returned to San Francisco. He will send a party of prospectors to the Sierra Madre mountains, Mexico, to be out six months.

MANAGER PROVOT is stated to have severed his connection with the Indiana-Sonora C. & M. Co., La Cananea, Sonora, Mexico. The properties are now in charge of C. E. Ricketts, consulting engineer for Phelps, Dodge & Co.

F. KLEPETKO, who resigned the management of the Anaconda, Mont., smelt-

ers some time ago to take the position of consulting engineer for the Haggin-McCune Copper Co., Peru, S. A., is still detained in New York City by illness.

H. A. SHIPMAN, former manager Stratton's Independence mine, Victor, Colo., goes for Bewick, Moring & Co. of London to take charge of the properties of the Cosmopolitan Proprietary Co., Western Australia, under a three years' engagement; salary, \$9000 for the first year and \$10,000 for each succeeding year. Mr. Shipman is now in Denver, Colo.

Catalogues Received.

A 4-page folder with mammoth half-tones portrays the successful carriage of salt in the works of the Colonial Salt Co., Akron, Ohio, by the use of the Robins belt conveyors, made by the Robins Conveying Belt Co., Park Row Bldg., New York City.

Advance Sheet No. 15, of the Jeanesville Pump, gives in graphic form a series of representations of that apparatus, showing range of operation, design and construction, with detailed data as to everything of possible connection therewith, apparently forestalling any question likely to be asked by intending purchasers. There is a separate treatise on "The Application of Condensers to Pumping Plants" that is of equal merit. The whole is admirably arranged and will be sent on request to the Jeanesville Iron Works Co., Jeanesville, Pa., or 1328 Seventeenth street, Denver, Colo.

The Crane Co.'s complete pocket catalogue of steam goods, etc., of date August, 1902, 4x7 inches, contains 464 pages, gives twenty-one full-page views of its different buildings and branches in principal United States cities, has a concise index summary, a convenient index and detailed illustrated showing of styles and prices of the numerous steam appliances that giant concern supplies. There are several new tables and the arrangement of the entire contents is such that any one subject can be readily found and understood. The bound volume will be sent to any address upon application to the company's central office at Chicago or of any of its numerous branches.

Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

PORTABLE HAY-LOADING DERRICK.—No. 708,199. Sept. 2, 1902. E. Brust, Davisville, Cal. The object of this invention is to provide a compact, rigid, economically constructed device to be used for loading or stacking hay and the like. It is adapted to be moved readily from place to place in the field, requires no side stays or guys to steady it, and when placed in proper position it will pick up a load at any desired point and automatically swing the load to the point of discharge. It consists of a wheeled frame or base, a pillar or mast pivotally supported thereon, trapezoidal supports upon said base and carrying at their upper convergent ends oppositely disposed journal blocks in which the mast is turnable, a vertical truss rod connecting said blocks and the wheeled frame whereby the structure is rigidly united, a jib or arm supported intermediate of its ends upon the mast sheaves on either end of said arm, a fall rope woven through said sheaves, and direction sheaves upon the base frame, around one or the other of which said rope is adapted to pass; and other details of construction.

DUMPING WAGON.—No. 709,210. Sept. 16, 1902. J. J. Eagen, Oakland, Cal. This invention is designed to provide a simple dumping device applicable to the running gear of ordinary wagons. It includes a flat platform mounted on the running gear, a longitudinally sliding box or body having a plurality of compartments, means for locking the box in a horizontal position, or of allowing it to elide rearwardly for the purpose of dumping.

WOOL WASHING MACHINES.—No. 709,227. Sept. 12, 1902. J. Keefe, San Francisco, Cal. This invention is designed for cleansing wool and consists in the combination with washing tubs or tanks of a series of endless traveling helte in pairs within the washing tub having adjacent faces of the two belts moving in the same direction, and one or both having projecting spurs to insure the travel. Carrying rollers receive the wool at the upper ends of the belts, and it passes thence through squeezing rollers and is again submerged in the second tank, through which it passes in like manner, and so on until it is sufficiently cleansed.

ANIMAL EXTERMINATOR.—No. 709,207. Sept. 16, 1902. L. N. Cornett, Natividad, Cal. This invention is designed to generate smoke or other noxious vapors, and to force such vapors into the holes of burrowing pests, such as gophers, squirrels and the like, the apparatus being portable. The generator chamber has a removably perforated receptacle fitted therein and adapted to contain the combustible materials, an air compressor and connection between the compressor and the generator.

HARNES ATTACHMENT.—No. 708,676. Sept. 9, 1902. J. T. Surbaugh, Arbutuckle, Cal. The object of this invention is particularly to provide a means for securing buckles, rings and the like upon harness or wherever else buckles and rings are used in connection with a leather or like support; and to provide a durable reinforcement for

the ordinary leather strap and stitching by which buckles and rings are held. The fastening device is carried by the strap and a retainer consisting of a metal plate between the layers of the strap, the plate being of less width than the strap and bent at its center, and the members brought together to lie one on the other in direct contact and concealed from view by stitching the edges of the layers together. A rivet passes through the end of the plate and the strap to secure the parts together.

ROCK DRILLS.—No. 709,191. Sept. 16, 1902. R. Avery, Sausalito, Cal., assigned to R. Avery Drill Co. of San Francisco, Cal. This invention is designed to improve the mechanism for carrying turning and reciprocating drills such as are used for perforating rock. The drill is so supported that it may be directed in any direction, and may also be withdrawn, moved out of line with the hole and restored to its proper direction whenever necessary. Connected with the drill is a mechanism operated by a flexible cord which is connected with the person of the bummer welder, so that the swing of the body will raise and turn the drill at each movement, and place it in position for a new stroke, the whole business being carried on by a single process.

BAG MAKING MACHINE.—No. 709,451. Sept. 16, 1902. J. F. Ames, Portland, Or. This invention is designed for the manufacture of bags complete from cloth which is furnished in continuous rolls or lengths of any desired quantity. The apparatus includes means for feeding the cloth from a continuous roll and advancing it through the machine, first to a cutter by which it is cut to the desired length, second to a folder by which the separated sheet is folded centrally to bring the edges together. This sheet is then advanced to a sewing machine which sews one end. It is then advanced to a point where its direction of motion is changed, and is moved transversely and at right angles with its former direction thus passing the edges of the folded sheet through another machine, sewing up this edge. Bags thus formed have the advantage of having a finished selvage at the open mouth.

GLOVES.—No. 709,555. Sept. 23, 1902. R. N. Carson, San Francisco, Cal. The object of this invention is to provide an improvement for gloves which are used for handling hot metal, wire ropes and other uses where there is great strain and wear, and it consists in a novel reinforcement for the palm and the inside of the thumb and forefinger, so that these extensions will receive the principal part of the wear and prevent the rapid destruction of the glove.

CULTIVATING PLOW.—No. 709,601. Sept. 23, 1902. A. Horner, Paaulio, Territory of Hawaii. This plow is especially designed for working the ground between rows of sugar cane or equivalent vegetable product which is grown in a similar manner. It consists of a pair of angularly mounted revolving disks adjustable forward and backward with relation to the team and inclining toward each other at the top, a double or shovel plow adjustably located in front of the disks and a sub soil plow in the rear, these parts being all adjustable with relation to each other, so that the ground can be thoroughly cultivated, weeded, destroyed and the earth hilled up against the rows to any desired degree.

TRACTION ENGINE.—No. 709,593. Sept. 23, 1902. Daniel Best, San Leandro, Cal. This invention is designed to provide an elastic support for the boiler, engine and supporting frame, and such connection between the frame and the hearing wheels and axle that the movement of the supported parts upon the springs will not interfere with the proper meshing of the gears by which power is transmitted.

METALLIC FENCE POST.—No. 709,617. Sept. 23, 1902. J. A. Utter, Crawfordsville, Ind., assigned to J. F. Utter, San Francisco, Cal. This invention provides a metallic fence post having a cement base, the post being durable and ornamental in character and capable of standing firmly in the ground and holding the horizontal line or woven wires of a fence securely by means of metallic clamps so adjustable in character as to allow the wires to be fastened to the upright bars of the post at any desired distance apart, and to be readily shifted up and down with relation to each other.

ADJUSTABLE LOADING CHUTE.—No. 709,609. Sept. 23, 1902. L. Rosenfeld, New York, N. Y. This device is designed for loading vessels from lighters, docks and other places where the vessel may be at a very considerable height above the point from which the coal or other cargo is to be discharged into the vessel. A frame is rigidly secured to the deck of the vessel, an inclined chute, one end resting upon a transverse support slidable in vertical guides on the frame, and the other suspended in such a manner and so adjustable as to deliver the material into the desired receptacle.

New Patents.

DEWEY, STRONG & CO.'S SCIENTIFIC PRESS PATENT AGENCY, 330 Market St., S. F., has official reports of the following U. S. patents issued to Pacific coast inventors:

FOR THE WEEK ENDING SEPT. 23, 1902.

709,733.—MINING DREDGE—Barton & La Bud, Oakland, Cal.
709,813.—MOUTH MIRROR—Bennett & Thatcher, S. F.
709,593.—TRACTION ENGINE—D. Best, San Leandro, Cal.
709,571.—FURNACE—W. N. Best, Los Angeles, Cal.
709,737.—CONVEYER—M. Bradfield, Los Angeles, Cal.
709,743.—WRENCH—C. Bushy, Fossil, Or.
709,596.—GLOVE—E. N. Carson, S. F.
709,534.—SHOE LACING HOOK—N. H. Clark, S. F.
709,476.—COOKING CABINET—H. F. Fashian, S. F.
709,601.—PLOW—A. Horner, Paaulio, Hawaii.
709,822.—ORE CRUSHER—C. C. Laue, Los Angeles, Cal.
709,782.—OIL BURNER—L. K. Leahy, Los Angeles, Cal.
709,517.—CONVEYER—G. W. Menefee, Berkeley, Cal.
709,609.—LOADING CHUTE—L. Rosenfeld, S. F.
709,725.—BOOKKEEPING—C. Seliz, Seattle, Wash.
709,803.—OIL BURNER—J. P. Simonsen, Oakland, Cal.
709,541.—POUCH—Smithline & Zaiser, Los Angeles, S. F.
709,521.—AIR COMPRESSOR—E. Y. St. Croix, Madrona, Wash.
709,613.—FRUIT GRADER—F. Stebler, Riverside, Cal.
709,562.—FRUIT CLEANER—Swan & Richardson, Ontario, Cal.
709,557.—CLITCH—E. Turney, Portland, Or.
709,806.—INDICATOR—H. S. Tittle, Los Angeles, Cal.

Latest Market Reports.

SAN FRANCISCO, Oct. 3, 1902.

METALS.

SILVER.—Per oz., Troy: London, 23½d (standard ounce, 925 fine); New York, bar silver, 51½c, refined (1000 fine); San Francisco, 51c; Mexican dollars, 43½c San Francisco, 40½c New York.

COPPER.—New York: Standard, \$10.75@11.25; Lake, 1 to 3 casks, \$11.65; carload lots, \$11.25; Electrolytic, 1 to 3 casks, \$11.45; carload lots, \$11.25; Casting, 1 to 3 casks, \$11.40; carload lots, \$11.25. San Francisco: \$14.00. Mill copper plates, \$17.00; bars, 18@24c. London: £53 6s 3d spot per ton.

The exports of copper for the month of September were 12,354 tons, making the total since January 1st 130,179 tons, as compared with 69,650 tons for the same period last year and with 120,594 tons in 1900.

LEAD.—New York, \$4.12½; Salt Lake City, \$3.50; St. Louis, \$4.00; San Francisco \$4.50, carload lots, 4½c 1000 to 4000 lbs.; pipe 5½, sheet 6, bar 5½c; pig, \$4.75. London: £10.15s per ton.

New York reports assert that plans are concluded for formation of a lead combination to include all the important lead manufacturing concerns in the country, capital to be \$60,000,000, and plans for financing the deal satisfactorily arranged.

"It is expected that interests identified with the American Smelting & Refining Co., the Morton Trust Co. and the National Lead Co. will be the concerns which will supply the necessary cash. The scope of the new combination will include manufacturers of sheet, pipe and white lead rods. The American Smelting & Refining Co., which is the largest producer of pig lead in the country, will also be largely interested as a stockholder.

"The directors will be chosen from the present board of directors of the National Lead Co., the American Smelting & Refining Co. and the Union Lead & Oil Co."

The matter is of prime importance to lead mining, for with such a combination as above outlined the entire production and use of that metal, from the vein to its sale as white lead, pig lead, sheet lead or lead pipe, would be under one management. The new combine is understood to be the personal undertaking of Benjamin Guggenheim, who is not a general partner in M. Guggenheim's Sons. He is said to have been attracted by the opportunities for economy and increased profit promised by the centralization of every branch of lead production and manufacture under a single management. The Union Co. attracted the attention of the National Lead interests through the use of the Bailey method of corroding lead, and it is said President Cole of the National Co. concluded that the combination of the two companies had become a trade necessity. When Benjamin Guggenheim saw that a combination of the lead users of the country was about to take place he resolved to secure it for a partner or an ally to the great smelter combine.

SPELTER.—New York, \$5.50; St. Louis, \$4.50; London, £19 per ton; San Francisco, ton lots, 6½c; 100-lb lots, 7c.

ANTIMONY.—New York, Cookson's, 9½c; Hallett's, 8½c; San Francisco, 1000-lb. lots, 10c; 300 to 500 lbs., 11c; 100-lb. lots, 13@15c.

TIN.—New York, pig, \$25.30; San Francisco, ton lots, 29c; 1000 lbs., 29c; 500 lbs., 29c; 200 lbs., 29½c; less 30c; bar tin, 3½c. London, £115 12s 6d spot.

PLATINUM.—San Francisco, crude, \$18.00 ½ oz.; New York, ingot, \$19.00 per Troy oz. Platinum ware, 75@80c per gram.

QUICKSILVER.—New York, \$48 00 large lots; London, £8 15s; San Francisco, local, \$46.00 ½ flask of 7½ lbs.; Denver, \$49.65. Export, \$44.50.

BABBITT METAL.—San Francisco, No. 1, 10c; No. 2, 7c; No. 3, 6½c; extra, 1½c; genuine, 35c; Eclipse, 37½c.

ALUMINUM.—New York, No. 1, 99% pure ingots, 35c; No. 2, 90%, 30c to 34c.

SOLDER.—Half-and-half, 100-lb. lots, 19c; San Francisco, Plumbers', 100-lb. lots, 16½c.

NICKEL.—New York, 50@60c ½ lb.; ton lots, 45@48c.

STRUCTURAL MATERIALS.

IRON.—Pittsburg, Bessemer pig, \$22.50; gray forge, \$20.50; San Francisco, bar, 3c ½ lb., 3½c in small quantities.

STEEL.—Bessemer billets, Pittsburg, \$31 and \$31.50; open hearth billets, \$33 and \$33.50; San Francisco, bar, 7c to 12c per lb.

CEMENT.—Germania, \$2.45; K. B. & S., \$2.80; Howmoor, \$2.75; Trowell, \$2.75; Portland, \$3.00 per bbl.

LIME.—Santa Cruz, \$2.00; Roche Harbor, \$2.00 per bbl.

LUMBER.—(Retail): Pine, ordinary sizes, \$20 00@22 00; extra sizes higher; redwood, \$22.00@23 00; lath, 4 feet, \$4.25 @4.50; pickets, \$19.50; shingles, \$2.35 for No. 1 and \$2.00 for No. 2; shakes, \$13 50 for split and \$14.50 for sawed; rustic, \$26.00 @32.00.

NAILS.—Per keg (list prices): No. 20d to 60d, Wire, \$3.30; Cut, \$3.30; 10d to 16d, Wire, \$3.35; Cut, \$3.35; 8d, Wire, \$3.40; Cut, \$3.40; 6d and 7d, Wire, \$3.50; Cut, \$3.50; 4d and 5d, Wire, \$3.60; Cut, \$3.60; 3d, Wire, \$3.75; Cut, \$3.75; 2d, Wire, \$4.00; Cut, \$4.00. Special rates for carload lots.

GENERAL SUPPLIES.

POWDER.—F. o. b. San Francisco: No. 1, 70% nitro-glycerine, per lb., in carload lots, 15½c; less than one ton, 17½c. No. 1*, 60%, carload lots, 13½c; less than one ton, 15½c. No. 1** 50%, carload lots, 11½c; less than one ton, 13½c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2* 35%, carload lots, 9½c; less than one ton, 11½c. No. 2** 30%, carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 728 kegs, \$1.50 per keg; less car lots, \$2 per keg.

CAPS.—3x, \$5.50 per 1000; 4x, \$6.50; 5x, \$8; Lion, \$9, in lots not less than 1000.

FUSE.—Triple tape, \$3.60 per 1000 feet; double tape, \$3.00; single tape, \$2.65; Hemp, \$2.10; Cement No. 2, \$3.00; Cement No. 1, \$2.65, in lots of 3000 feet and up.

CANDLES.—Granite 6s, 16 oz., 40s., 10½c ½ set; 14 oz., 40s., 9½c.

COAL.—San Francisco, coast, yard prices: Wellington, \$3; Seattle, \$6.50; Coos Bay, \$5.50; Southfield, \$8.00. Cargo lots, Eastern and foreign: Wallend, \$7.00; Brymbo, \$7.50; Pennsylvania, hd., \$14.00; Scotch, \$8; Cumberland, \$12; Cannel, \$9.50; Welsh Anthracite, \$13.00; Rock Springs, \$9.50, long ton, Colorado Anthracite, \$14.00. Coke, \$10.50 per ton in bulk, \$13 in sacks; Sunnyside, \$8.50, long ton.

CHEMICALS.—Cyanide of potassium, 98%-99%, jobbing, 27@28c ½ lb.; carloads, 25@26c; in 10-lb. tins, 38c; sulphuric acid, in carboys, 66½ B, 2c ½ lb.; soda ash, \$2.00 100 lbs.; hyposulphite of soda, 2½@3c ½ lb.; blue vitriol, 5½@6½c ½ lb.; borax, concentrated, 7@8c ½ lb.; chlorate of potash, 12@13c; roll sulphur, 3c; alum, \$2.00@2.25; flour sulphur, French, 3½@3¾c; California refined, 2@2½c; nitric acid, in carboys, 8c ½ lb.; caustic soda, in drums, 3@4c ½ lb.; Cal. s. soda, bbls., \$1.25 @1.50 100 lbs.; sks., \$1.05; chloride of lime, spot, \$2.50@2.60; nitrate of potash, in bbls., 8c; caustic potash, 10c in 40-lb. tins; sulphide of iron, 9c ½ lb.

OILS.—Linseed, boiled, bbl., 57c; cs., 62c; raw, bbl., 55c; cs., 60c; lots of 5 bbls., 1c less; Lucol oil, boiled, bbl., 50c; cs., 55c; raw, bbl., 48c; cs., 53c. Kerosene—Pearl, per gal., 20c; Astral, 20c; Star, 20c; Extra Star, 24c; Ecocene, 25c; Elaine, 22c; Water White, in bulk, 13½c; Mineral Seal, iron bbls., 19c; wooden bbls., 22½c; cs., 25c; Mineral Sperm, cs., 26½c; Deodorized Stove Gasoline, bulk, 17c; do., cs., 23½c; 86° Gasoline, bulk, 21c; do., cs., 27½c; 63° Naphtha or Benzine, deodorized, in bulk, per gal., 16c; do., in cs., 22c; Lard Oil, No. 1 bbl., 95c; cs., \$1.05; Neatsfoot Oil, bbl., 70c; cs., 75c; No. 1 bbl., 52½@55c; cs., 57½@60c; Sperm, crude, 60c; Natural White, 65c; Bleached do, 70c; Whale Oil, cs., 55c.

WHITE LEAD.—Per lb., in kegs: Five tons and over at one purchase, per lb., 6c; 1 ton and less than 5 tons, per lb., 6½c; 500 lbs. and less than 1 ton, per lb., 7c; less than 500 lbs., per lb., 7½c; in 25-lb. tin pails, 4c per lb. above keg price; in 1 and 5 lb. tin cans, 100 lbs. per case, 2½c per lb. above keg price. Dry Lead—In bbls., 1 ton and over, 6c; do. in kegs, 6½c.

RED LEAD AND LITHARGE.—One ton and over at one purchase, per lb., 6c; 500 lbs. and less than 1 ton, per lb., 6½c; less than 500 lbs., 7c.

ASSAY LITHARGE.—Per lb., 8½c.

BISMUTH.—Subnitrate, per lb., \$1.60.

BONE ASH.—4c ½ lb.

BORAX.—Crystal, 7c; calcined, 25c.

CHROMIUM.—(90% and over) per lb., \$1.25.

COPPER.—Carbonate, 20c; Red oxide, ½ lb., 60c.

MAGNESIUM.—Per lb., \$3.00.

MANGANESE.—(90% and over) ½ lb., \$1.25.

MERCURY.—Bichloride, ½ lb., 90c.

MOLYBDENUM.—25c. ½ gramme; 1000 grammes—2½ lbs.

PHOSPHORUS.—(American) ½ lb., 80c.

SILVER.—Chloride, ½ oz., 75c; nitrate, 55c.

SODIUM.—Metal, ½ lb., \$1.00.

URANIUM.—Oxide, ½ lb., \$3.50.

ZINC.—Metallic, chemically pure, ½ lb., 50c.

ZINC.—Dust, ½ lb., 10c.

ZINC.—Sulphate, ½ lb., .04c.

(These prices are wholesale, f. o. b. San Francisco, unless otherwise noted.)

SITUATIONS WANTED.

Mining Engineer wants position as superintendent. Practical miner, millman, cyanider and assayer. Experience extending over twelve years. Graduate School of Mines. Address A. R. S. M., this office.

Cyanide Chemist, at present superintendent of cyanide mill, will be open for engagement after the 15th of October. Has been assayer of custom mill and mint. Ten years' practical experience of gold metallurgy in different countries. Address A. B. C., care Mining and Scientific Press, 608 Mack Block, Denver, Colo.

Have had eight years' experience as chief chemist and assayer for large copper smelting companies; since then have been in charge of mines and smelting operations. Would like a position with some good, reliable company; can give the best of reference. Address E. M. C., this office.

ASSAYER wishes to change position. Is also experienced amalgamator and miner. Would like to take charge of small plant. Speaks Spanish. "Aleman," Mining and Scientific Press.

GOLD DREDGING.—Mining engineer with 8 years practical experience in gold dredging is open for an engagement. X. Y. Z., care Mining and Scientific Press.

COMPETENT SUPERINTENDENT wants position in California; 15 years' experience in running mines, mills and smelters for profit, and managing men. College bred and technically educated. Formerly held positions as assayer, mining engineer, accountant, superintendent, and manager. Member A. I. M. E. High testimonials. Address "Superintendent," Box 813, Seattle, Wash.

WANTED.

Position as superintendent or assayer. Have had experience in mining, milling, cyaniding, smelting and putting up machinery and operating the above. Have a good assay outfit. Can sharpen tools. J. L. Wetmore, 1223 S. San Joaquin St., Stockton, Cal.

WANTED.

WANTED.—BY TWO ENERGETIC AND EXPERIENCED mining men the acquaintance of persons interested in the development of mining property in old Mexico. Address D. L. C., care of this office.

WANTED.

SURVEYORS' TRANSITS.
Box 73, Stockton, Cal.

WANTED.

Mine or Dump of REFRACTORY ORE, on working bond or lease.
Address C. W. C., care of this office.

CASH BIDS on 20 Stamp Mill, complete, 1000-lb. stamps. Wanted, First-Class Millwright to erect the same. Wanted, First-Class Superintendent, Machine Drill Men, Miners and Timbermen, Mining Blacksmith, First-Class Electricians—Constructing, Superintending and Operating. Address "Gold Mine," care of Mining and Scientific Press.

FOR SALE.

FOR SALE.—Well established Assaying and Engineering business in principal city in northern California. Building (on leased ground), nice furniture assaying and analytical equipment cheap for cash. Fine opportunity for two young men. Good reasons for selling. References. Address Box 100, Kidding, Cal.

The Mines Exchange, Ltd.

Mines and prospects in British Columbia, the Western States, and Mexico, for sale. Free milling gold properties a specialty. Write us for reports and information. Bank references given. Address THE MINES EXCHANGE, LTD., P. O. Box 594, Salmon City, Idaho.

ASSESSMENT NOTICES.

LARKIN MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, near Placerville, El Dorado County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 28th day of September, 1902, an assessment (No. 3) of two (2) cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the secretary, at the office of the company, 112 Main street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 1st day of November, 1902, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 24th day of November, 1902, to pay the delinquent assessment, together with the costs of advertising and expenses of sale. By order of the Board of Directors.

N. F. REMINGTON, Secretary.

Office—112 Main street, San Francisco, California.

MARINA MARSICANO GOLD MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Sunny Hill, Sbaeta County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 28th day of September, 1902, an assessment (No. 3) of two (2) cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the secretary, at the office of the company, 415 Front street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 1st day of November, 1902, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 24th day of November, 1902, to pay the delinquent assessment, together with the costs of advertising and expenses of sale. By order of the Board of Directors.

OHAS. BOVONE, Secretary.

Office—415 Front street, San Francisco, California.

MINING AND SCIENTIFIC PRESS

Whole No. 2203.—VOLUME LXXXV.
Number 16.

SAN FRANCISCO, CAL., SATURDAY, OCTOBER 11, 1902.

THREE DOLLARS PER ANNUM.
Single Copies, Ten Cents.

Fuel Oil on Railways.

Little fuel oil is in use on railways as yet. Its use is increasing, and in California coal is being dispensed with. The Southern Pacific Co., operating in California, Nevada, Arizona, Oregon and Texas, has determined on converting every locomotive on its line into oil burners. By December, 1903, coal will have been abandoned by that railway company.

Elaborate tests show that the railway engines on one division on an average require twenty-four barrels of oil for every 100 miles. To fire with coal for the same distance would take five tons, the saving per 100 miles by using oil ranging from \$16 to \$20, the company figuring that on the coast divisions alone can thus be secured a saving of \$100,000 per month. Apart from the manifest economy of the change from coal to oil, the matter becomes one of present necessity for some Pacific coast roads because of the Pennsylvania and Utah coal shortage, it being at present almost a choice between going back to wood or changing to oil, the latter, of course, being preferable.

So great an industrial change has had the effect of directing attention to the methods of handling this fuel oil at railway terminals—how it is delivered from tank cars to storage tanks, and thence to the locomotive tenders. At a recent meeting of the Pacific Coast Railway Club at San Francisco, Cal., this was made a special subject, and much information was given. The matter is one of at least secondary interest to miners and metallurgists everywhere, as the use of oil is spreading and the economics of its distribution is hence deemed of sufficient importance to be noted in a mining paper.

At Tucson, Arizona, and Bakersfield, Cal., the oil from the tank cars is unloaded by means of compressed air at a pressure of fifteen pounds. This is slow, as it takes thirty-five minutes to unload a car, and as the cars are not air-tight there is considerable waste of air. Steam is used to heat and thin the oil, when necessary, the oil being piped to a two-compartment storage tank and thence fed direct to the tenders by air pressure. In large quantities it can be more readily got into the tender by gravity from an elevated tank, being first forced into the latter by steam or air pressure. This is the method in use at Los Angeles, Cal., where 50,000 barrels per month are used. At Oakland, Cal., where 25,000 gallons per hour are used, the oil is discharged from the tank cars into a 12-inch pipe, eight or ten cars being simultaneously connected therewith, and

thence pumped to the storage tank, from there pumped again to an elevated tank, whence it flows by gravity into the tenders. The same system is in use at other stations where considerable amounts are handled. The cost of pumping is figured at 3 cents per 1000 gallons. The general experience is that in small stations pumping is preferable. Where large amounts are used the gravity system is most economic. Mining companies using fuel oil could probably find a rotary pump with a gas engine for power, or a force pump with steam power, of greater value than building and maintaining the structures necessary for delivery by gravity, as that seems only to be best applicable where the quantity handled, as in the case of railways, justifies the initial expense.

Ancient California River Beds.

It has been said that some streams of California have been turned bottom upwards. It would be truer to say they are piled one over another three or four stories deep. This labyrinthine system of water works is puzzling to the geologist as well as to the miner. The information gathered by the miner in drifting along these ancient courses is practically all known concerning them. From knowledge thus gained geologists have attempted to classify and map out their topography and grades; but the limited areas touched by the miners makes the task of the geologist a difficult one; and it is not surprising that such eminent authorities as Le Conte and Whitney disagree in regard to some of the forces which have effected the evolution of this intricate system. The renewed activity in drift placer mining

may clear up many points regarding these old water systems that are obscure. It is sufficient to know that whether any of them which may be made available, either for the production of gold or water, belong to the first, second or third drift periods; or whether their courses ran north, east or south; and crossed or recrossed each other in their meanders; and whatever their average grades may have been, it is certain that all of them eventually turned to the west, and flowed into the Pacific ocean, or its counterpart which then existed. It is suffi-

cient to know that these ancient systems extended into southern California; and however their channels became filled—whether by depositions when submerged in ocean depths, or by upheaval of barrier dykes from beneath, or by overflows of volcanic matter which filled up and obstructed their courses; or by all of these causes consecutively combined—the fact is that these old channels still exist, and that they contain gold in great quantities. Drift mining in California has an unlimited future before it. Hundreds of millions of dollars will be taken from the ancient placers—the auriferous gravels of the water courses of a former age now buried under lava and other deposits. Only a fraction of the rich ancient channels have been tapped. These buried beds of old rivers where drift mining has been chiefly pursued are met with high among the foothills where their courses have been cut across by modern streams, through which their waters have been to a great extent drained off, leaving the gold in the deposits of gravel near bedrock. These are the placers sought for by miners, and are generally supposed to belong to the second or third drift period as classified by geologists. The extent of unprospected old river beds is only a matter of conjecture.

As the modern rivers drained the old channels, where higher position and porous nature of the materials with which the older beds were filled permitted this to be done; so, toward the coast, the ancient rivers pass under the modern—their position is reversed—and in this case the older channels drain off, or largely absorb the waters of the present open surface water courses; except at flood times, when all channels—both ancient and modern—are filled to repletion.

Good authorities estimate the aggregate length of the ancient water channels in the State of California at 400 miles. This refers to the main channels only, and does not take into account the laterals or small branches which empty into the mains. It includes only the supposed workable gold-bearing channels, and does not take into account cemented tributaries, which from the miner's point of view are considered of slight economic importance. Based on the very limited drift workings which have been exploited this estimate is barely approximate. It is reasonable to conjecture that the lengths of the old, older and oldest systems of the three drift periods, as classified by geologists, were each of them equal in extent to the present river system—if granted the extent of drainage area and rainfall were the same.



Mill, Sampler and Boarding House, Silver King Mine, Park City, Utah. (See page 204.)

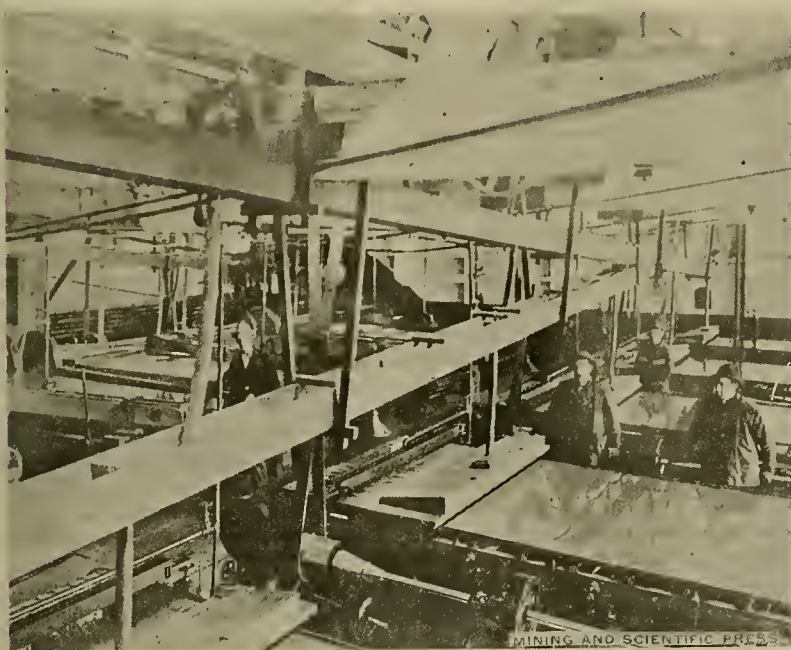


Table Floor of Silver King Mill, Park City, Utah. (See page 204.)

MINING AND SCIENTIFIC PRESS.

ESTABLISHED 1860.

Published Every Saturday at 330 Market St., San Francisco, Cal.

TELEPHONE, DAVIS 771.

ANNUAL SUBSCRIPTION:

United States, Mexico and Canada.....\$3 00
All Other Countries in the Postal Union..... 5 00

Entered at the San Francisco Postoffice as second-class mail matter.

Chicago Office (Telephone, Harrison 73).....737 Monadnock Block.
Denver Office (Telephone, Olive 733).....606 Mack Block.

J. F. HALLORAN.....Publisher.

San Francisco, October 11, 1902.

TABLE OF CONTENTS.

ILLUSTRATIONS.—Mill, Sampler and Boarding House Silver King Mine, Park City, Utah; Table Floor of Silver King Mill, Park City, Utah, 200. The Cripple Creek Reel; The Cummer Patent Mechanical Stoker, 207. Mining and Metallurgical Patents, 208.

EDITORIAL.—Usona; The History of a Catalogue; Making a Mine Report; British Columbia Mining Conditions; "Cyaniding Rock in Place;" Representation at the St. Louis Exposition; Cabinet Department of Mines and Mining; The Strike of the Coal Miners; A Modern Charcoal Plant, 201.

MINING SUMMARY.—200-210-211-212-213.

LATEST MARKET REPORTS.—214.

MISCELLANEOUS.—Fuel Oil on Railways; Ancient California River Beds, 200. Concentrates, 202. Direct Cyaniding of Wet-Crushed Ores in New Zealand, 203. The Silver King Concentrating Mill, Park City, Utah, 204. Sunlight a Variable Quantity; Power Required for Isothermal Compression, 205. The Gold Production of North America, Its Geological Derivation and Probable Future, 206. Oil Process for Ore Concentration; The Cripple Creek Reel; Refrigeration by Compressed Air; Self-Contained Dryer, 207. Mining and Metallurgical Patents; Removing Oil from Exhaust Steam; Gold on Hand to Be Produced, 208. Books Received; Catalogues Received; Personal, 213. Commercial Paragraphs; New Patents; Notices of Recent Patents, 214.

THERE is a new name or term coming into commercial use—Usona—as an abbreviated designation of this country—United States of North America—which is technically correct and at the same time easy to use and remember. Several concerns in various lines of business now hear that title, and its use is destined to grow.

In this issue appears the first of a series of articles on "The History of a Catalogue," of unusual interest to mining machinery manufacturers. It is written by a man who for many years has been engaged in the work of preparing such trade treatises. The catalogue is such an important and expensive adjunct of modern advertising that a critical discussion of it from the standpoint of practical experience must be interesting. It is the first time the matter has been so treated, but its importance deserves such notice. Mr. Fitch's statements and conclusions may not be unanimously accepted, but the publication of the series in this and succeeding issues will create a discussion of the subject that must be of benefit to all interested.

THERE are two ways of making a mine report, and while both may be correct the conclusions may exhibit considerable divergence. Some mine experts report gross values, others net values. The first could correctly report \$1,000,000 in sight in a mine; the other with equal correctness might be able to report not one dollar "in sight." For the property might be so constituted that while there was manifestly \$1,000,000 worth of ore available, yet the conditions were such that it would cost \$1,000,001 to extract and treat the ore. It is simply a question of reporting gross values or net values. As time goes on the tendency on the part of the mining engineer examining a mining property will be to report on the basis of net values. Just which is the most valuable depends largely upon the point of view. The investor will be inclined to attach more importance to the report that is based on probable net values.

STRONG objection is made to editorial statements concerning British Columbia mining conditions. But the statements are true, and it is just such publicity that will best help British Columbia miners. Nothing has been said that cannot be verified. The trouble with British Columbia is that it is governed too much. It has too many laws now. What it needs is a repeal of some of them. It is a good mineral country and this paper recognizes its importance. It is always easy and more agreeable to say only nice things, and easier still to ignore a locality, but con-

ditions can generally be improved by publicity. The policy of this journal is a creative one, and whether it be British Columbia or anywhere else that mining is carried on, this paper has intelligent opinion on existing conditions and wants to aid in that section's advancement. That is part of what the paper is for.

In the issue of February 2, 1901, appeared an article written by a California miner entitled "Cyaniding Rock in Place," which was a humorously exaggerated account of what purported to be a plan of wholesale treatment of gold ore by cyaniding without the trouble of even removing it from its pristine location with satisfactory result. By one of those coincidences that are sometimes noticeable, in the same part of the State has been tried the successful experiment of dispensing with the usual fine crushing, from 80% to 90% of the values being extracted by the cyanide process from the ore crushed solely by the use of a rock breaker and a grizzly, the consumption of cyanide being about one-half pound per ton of ore, length of treatment from sixty to ninety hours. The ore is an oxidized iron pyrite in Shasta county, Cal., and like similar California gold ores needs but to be cracked rather than finely comminuted, the structure of the quartz being so weakened by the intrusion of the pyrite as to readily break in the work of coarser crushing, leaving the gold particles to be readily acted upon by the cyanide solvent.

THE advantage of proper representation of the mining industry at the St. Louis Exposition is commended to the attention of the legislatures of the mining States. Mention is made just now because in many mining commonwealths is going on present active canvass of votes for State senates and assemblies, and the matter is worthy of being brought to the attention of those seeking election. They will compose the legislature in their State or Territory that will pass upon the bills introduced next winter making State appropriation for mineral exhibits at the St. Louis Exposition. Rightly managed, small appropriations could be made a paying investment in every case. The tendency is to make big appropriations and put them into the hands of incompetent men. Instances of the truth of this will occur to every reader. Better a State or territorial appropriation of \$25,000 judiciously administered, than a \$500,000 appropriation given over to grafters and parasites. Every mining State and Territory would find it good business as an advertisement to make appropriation next winter for representation of the mining industry at the coming exposition at St. Louis, Mo., and put it into the hands of men for distribution who have personal standing and integrity, and business ability beyond that required to audit and endorse foolish and unworthy expenditure of the people's money.

If any additional argument were needed in favor of a cabinet department of mines and mining, it is strikingly furnished by last week's action of President Roosevelt in his well-meant but unsuccessful efforts to get the coal operators and striking miners together. To those who have all along asserted that the proposed department was not needed the action of the President of the United States is commended as illustrative of existing facts. Of course opponents of the idea will write in reply to this, saying in effect: "Is it possible that you imagine that a department of mines and mining could have the slightest influence or effect upon the present unhappy situation?" Possibly no immediate effect at this critical stage. But all things work out in logical lines, and effect always surely follows cause. Suitable recognition of the importance of the mining interests of this country requires a cabinet department of mines and mining, not for control, but guidance. While this paper has all along considered that the metal mining industries of the Nation were most intimately concerned in this matter, and has advocated the measure solely in their interests, yet it is believed that if such department now existed suitable attention thereto bestowed upon the non-metallic mining interests of the country would tend to mitigate if not to wholly solve the pressing problem presented by the existing conditions even in coal mining. We are not unmindful of the conditions precedent to and now pulsating through

the strike—politics, greed, ill will, the great financial interests involved, and the stubborn joy some natures feel in fight, but despite all of these diverse factors in the problem it is our belief that had there been a cabinet department of mines and mining begun two years ago the present deplorable situation would not exist. As a business proposition the suggested department would "pay."

WIDESPREAD DISCUSSION of the present great strike of the anthracite coal miners brings out many points. There are a few that do not seem to have expression: One is that while nearly every other business is affected thereby, the business of gold mining is not in any way dependent thereon. Another is that the inevitable result will be more and wider use of machinery when work is resumed, as, of course, it ultimately will. A third condition is the future increased use of appliances for burning soft coal. Consumers of anthracite are now forced to experiment with soft coal burning devices, and such experience must result in improved equipment for the use of such coal with less production of smoke. It is the smoke and soot that constitute the chief objection to the use of bituminous coal, and it is probable that devices in that direction will be one result of the present strike that will make possible cleaner and more satisfactory use of soft coal. That such devices already exist is known, but the present conditions among Eastern coal users will direct immediate economic attention to their existence. Eventually this whole coal trouble means the realization among coal burners and steam users of the cost and unreliability of solid fuel and a "boom" for gas engine manufacturers. The American people have a faculty of cutting industrial knots, and when, as in this case, the question ceases to be one of employer and employee, and affects the public, a radical way of lessening future trouble in that direction will be found.

In a modern charcoal plant, such as that at Sault Ste. Marie, charcoal is made with minimum of handling and all the by-products are saved. The plant consists of twenty oven retorts, each of eight cords capacity, being 46 feet long, 6½ feet wide, 8½ feet high. These twenty retorts are set up between brick walls, about as a steam boiler would be set. A standard gauge railway track runs through each retort. The wood on iron cars holding two cords each is run into the retorts, 160 cords in all, each end door closed, fires started underneath and the wood carbonized into charcoal in from eighteen to twenty-four hours. Then the carbonized product is run into an iron cooler where it stays twenty-four hours, thence into another iron cooler where it stays twenty-four hours more, when it is ready for use. The wood alcohol acetate of lime, distillates of wood tar, creosote, guaiacol, etc., are all saved. This way of making coke and saving the by-products is comparatively new, the first plant of twelve ovens having been put up at Syracuse, N. Y., in 1893. Last year 1,179,900 tons of coke were produced by by-product ovens in this country, as against 12,850 tons in 1893. The 1901 value of the tar, sulphate of ammonia and ammoniacal liquor so produced was \$1,029,876—35% of the value of the coke produced. It is within the bounds of probability that in this country, as in Germany, the by-products of coke manufacture will pay all the costs of coal mining, coke making and other accruing expenses, making the coke itself a matter of net profit to the miner. It is interesting to note the variety of such by-products in the grimy production of coke and the multitude of their uses. The brilliant dyes that sparkle in the sunlight, the ammonium chloride used for galvanizing and electrical purposes, the carbonate used as baking powder in millions of kitchens, the aqua and anhydrous ammonia used in refrigerating and ice factories, and even cyanide of potassium, the solvent of gold, the latter derivable from ammonia. Cyanogen is another resolvable constituent, being an impurity which may be removed by the use of an alkaline iron salt; the cyanogen is formed into a ferro-cyanide of potassium or sodium in solution; this solution then evaporated to the crystallizing point and the crystals then purified. The list might be indefinitely extended. Coal tar used in the manufacture of roofing paper, street paving, etc.; creosote, benzol and other products, the whole constituting one of the triumphs of modern chemistry.

Concentrates

ONE pound copper is added to every \$2000 silver coined in the U. S. Mint.

By multiple cable is meant a cable containing two or more insulated conductors.

THE temperature of a 30-candle-power incandescent electric light would be about 2400° F.

HAVING 130 feet head of water and 48 inches water, would, theoretically, give 15 04 H. P.

THERE are about 1000 oil companies in California, and about 100 with stock of present purchasable value.

ONE PART RESIN, one part pitch and one part plaster of Paris, thoroughly mixed, forms a good lining for acid troughs.

THE "miner's ton" in Great Britain consists of 21 cwt. of 112 pounds each—2352 pounds—and by this ores and mattes are sold.

THE 276 miles of 8-inch pipe line from Bakersfield to Ft. Richmond, Cal., weighs 2½ pounds to the foot, 149,160 pounds to the mile.

THE ratio of friction to pressure for belts over wood drums is, for leather belts when worn, .47; when new, .5; when over turned cast iron pulleys, .24.

A MANILA ROPE, 3 inches circumference, weighs .297 pound per foot. Its breaking strain is 6115 pounds. A safe load for it in hoisting is 611 pounds.

THE best lubricant to use on aluminum when turning it in a lathe is either petroleum or water, and in the press, when it is being drawn or stamped, vaseline.

TO RENDER wood flexible, and at the same time non-inflammable, it is coated with or immersed in a 6% solution of caustic potash or a 5% solution of caustic soda.

A TON of ore that will average 1% quicksilver will produce twenty pounds, worth \$12. Should the ore average one-half of 1% right through, it can be handled profitably.

THE cost of coke ovens is dependent upon a variety of circumstances—locality, number, transportation, etc.; 500 coke ovens in that locality could probably be built for \$350 each.

OIL for fuel purposes has the following chemical composition: Carbon, 88%; hydrogen, 10.75%; oxygen, 1.25%. The two other impurities present in the mass are water and sulphur.

THERE is a special tariff on American machinery or appliances imported into the Philippines. It took effect Nov. 15, 1901. A copy of it can be had from any U. S. customs collector.

CADMIUM is a common constituent of zinc ore. The metal is now worth about \$1.50 per pound. The use of it is very limited, and a slight increase in the output would send the price tumbling.

HYDRATED FERRIC OXIDE is an antidote to arsenical poisoning, rendering that metal insoluble in water or in the fluid secretions of the body. To be most effective it should be freshly precipitated.

THERE will be a meeting of the executive committee of the California Miners' Association in San Francisco, on the 18th inst., to set date for the convention of 1902 and determine the future policy of the Association.

GOLD was discovered in Colorado in January, 1859. The State has yielded since then gold to the amount of over \$400,000,000. Gold was discovered in California in 1848. That State's gold output is figured by some statisticians as being about \$1,400,000,000.

THE gauge pressure being 100 pounds, the volume of free air used per shift of eight hours for a 3-inch drill at sea level is from 25,000 to 42,000 cubic feet; at 5000 feet elevation, 30,000 to 48,000 cubic feet; at an altitude of 10,000 feet, 35,000 to 60,000 cubic feet.

THREE CANDLES to a shift is a good allowance, and a miner ordinarily would have a little surplus. A shift boss or other underground worker moving around considerably would use five. Air drill workers would average about the same number.

IN mine timbering it is calculated that square timbers are about one-fourth stronger than round ones of the same diameter. The safe load of a timber column is 600 pounds per square inch for heights less than 20 feet. Freshly-cut timbers are from 25% to 40% weaker than when seasoned.

STEEL is used to a limited extent for "timbering" in American mines, mostly in Eastern anthracite collieries, and to a very limited extent in Colorado. The cheapness of wood and freight rates tend to indefinitely defer any likelihood of its use in Western metal mines for many years to come.

OF Straits tin about 550,000 tons have been exported during the last fifteen years, almost wholly from placer deposits. Perax produces about 22,000 tons and Selangor 15,000 tons annually. The supply seems inexhaustible. Tin has been discovered in commercial quantities in New South Wales and Tasmania.

THE bonnets of large valves are usually held on with bolts, hence are easily removed, but small ones sometimes cause trouble, as the brass is soft, so that when an attempt is made to remove them the wrench rounds the corners off without removing the bonnets. The largest available wrench should always be used for such work, because a small one will spring and damage the bonnet

more than a large one. Screw the jaws up as tight as possible, then strike the handle a smart blow with the hand or a mallet.

IT is difficult to state with even any approximate correctness the relative dissolving powers of different gold solvent solutions. In a general way it may be put this way: Chlorine, 1% solution, 1½ hours, 4.49%; bromine, 1% solution, 1½ hours, 6.46%; cyanide, 1% solution, 1½ hours, 0.57%—60° C. in each case.

THE St. Davids Gold & Copper Co., Ltd., is the only gold mine now being worked in Great Britain. In 1901 the company worked 15,503 tons ore, yielding 5533 ounces hulsion, which gave \$95,649. The concentrates were valued at \$2915—a total of \$6.35 per ton. The total expenses for the year were \$31,854.

IN the Oregon case mentioned, there is a manifest property right in the trade name used, and is not to be traded upon or used by any unscrupulous rival. If of sufficient importance to warrant the expense, an appeal to a court of competent jurisdiction would afford protection against the fraudulent competitor.

SOME commercial potassium cyanide contains impurities, especially sodium compounds. The U. S. Board of Appraisers, at their last examination to determine the duty on the imported article, examined eighty samples; of these, fifty contained no sodium cyanide; the other thirty contained from 10% to 54% sodium salt—an average of about 22%. The duty on potassium cyanide is 12½%.

CHEMICAL HARD LEAD is a specific term to designate a certain kind produced mostly from lead ore containing no silver. It withstands the action of acids, and costs a little more than ordinary lead. It contains a small percentage of copper or antimony and is mostly used in sheet and pipe manufacture. A recent patent for its preparation gives an alloy of lead with 0.1% to 0.5% copper and 0.1% to 0.3% antimony.

TO TURN blue prints to a rich brown color, a piece of caustic soda about the size of a bean is dissolved in five ounces of water and the blue print immersed in it, in which it will take an orange yellow color. When the blue has entirely left the print, it should be washed thoroughly and immersed in a bath composed of eight ounces of water, in which has been dissolved a heaping teaspoonful of tannic acid. The prints in this bath will assume a brown color that may be carried to almost any tone, after which they must again be thoroughly washed and allowed to dry.

THERE are several methods of rendering paper transparent. Coat white paper with a solution of Irish moss in water, to which a slight quantity of previously dissolved gelatine has been added. It should be applied hot to the paper. When colors are desired, they must be transparent; they must be ground in varnish, and a stronger varnish is required than for opaque colors. A fine yellow may be produced by using yellow lake and red sienna. These make a warmer color than the yellow lake alone. If cost is no objection, auramine may be used. For pale red, madder lakes should be employed.

STRONG Portland cement is heavy, weighing 112 pounds per bushel. Weak cement is light. Strong cement is of a greenish gray color and sets slowly. Weak cement is of a brownish color, has too much clay in it, and sets quickly. The longer it is in setting the more its strength increases. The cleaner and sharper the sand, and the stiffer it is gauged, i. e., the less water used in working it up, the better. Salt water is as good for mixing with Portland cement as fresh water. It is of the greatest importance that the bricks or stone with which the cement is used should be thoroughly soaked with water. If under water in a quiescent state, the cement will be stronger than out of water. Whatever concrete is employed under water, care must be taken that the water is still; otherwise a current will carry away the cement and leave only the clean aggregate.

DYNAMITE is composed of nitro-glycerine and a dry substance called the absorbent. In its manufacture the nitro-glycerine is made first, which is prepared by the action of a mixture of concentrated nitric and sulphuric acids upon glycerine, introduced drop by drop. The nitro-glycerine is introduced into a large tank arrangement which is filled with the absorbent—a form of powder made up of wood meal and nitrate of soda. As a result of this absorbing process dynamite is obtained. The substance very closely resembles brown sugar in appearance. Then the dynamite is made into cartridges or sticks. The cartridges are cylindrical in shape and are generally 8 inches long, 1½ inches in diameter, and weigh half a pound each. The outer coating of the stick is of heavy waxed paper. In fact, a cartridge is simply a cylinder of this waxed paper tightly packed with dynamite. Before dynamite will explode from heat the temperature must rise to 350°.

IN electrolytic copper refining the copper alloy or blister copper is cast into slabs which are used as anodes in a bath containing a slightly acidulated solution of copper sulphate. The electrolyte is kept in continuous circulation. Pure copper is deposited from the solution upon pure copper cathodes at a current density of from fifteen to twenty-five amperes per square yard. Copper is simultaneously dissolved at the anode, and the alloyed gold, silver and other metals drop as slime to the bottom of the cell, to be parted and recovered later. After deposition the cathodes are melted up, poled and cast into wire-bars or other suitable forms. The poling

of copper consists in stirring the molten metal with a pine stick. The stick carbonizes, and, as a result, reduces cuprous oxide which is present in the molten copper. Upon cooling, cuprous oxide gives up its oxygen to metallic impurities which may be present in the copper. As the mechanical and electrical properties of the copper are better when impurities exist in the form of oxides rather than as metals, the proper amount of poling is when just sufficient cuprous oxide is left to oxidize the impurities. Overpoled or underpoled copper is brittle and of inferior conductivity.

IN smelting lead ores rich in zinc in a blast furnace H. E. Fry first calcines the sulphide ores so as to eliminate the greater part of the sulphur; he then mixes sulphate of soda and oxide of iron thoroughly with the calcined ore, briquetting the compound, the resulting briquettes then smelted in an ordinary cupola or blast furnace, the lead, silver and gold being obtained in metallic form, the zinc passing into the slag or residue, from which it is recovered as oxide of zinc. The sulphate of soda facilitates the smelting of the ore; the recovery of the lead and silver is stated to be satisfactory; that of the zinc is nearly 70%. The Collins process for extracting zinc and copper from their ores uses "niter cake," a product resulting from the manufacture of nitric acid. This substance is composed of sulphate of sodium, 75.80%; free sulphuric acid, 16.68%; water, 6%; insoluble matter, 1.52%. While the strength of the solution may be varied according to the character of the ore to be treated, a saturated solution is generally used. The process consists in immersing the zinc or copper ore roasted or otherwise, in a powdered state, in a bath of water in which more or less of the niter cake is held in solution, and in subjecting the powdered ore to the action of this solution, until all the copper or zinc present is dissolved out and extracted from the ore. The bath is then filtered to remove the residual ore and the copper or zinc electrically deposited from the solution or otherwise precipitated as may be preferred.

APPARATUS for making blue prints by electric light is now common. There is a vertical glass cylinder, 3 feet in diameter 5 feet high, mounted on a revolving base, so that it may be rotated about a fixed center, and thus facilitate the loading and unloading operations. On this center line, and over the cylinder, there is an electric arc lamp of 1100 watts capacity, which may be made to gradually descend through the center of the cylinder to the floor, by means of an escapement mechanism and a system of pulleys. The glass cylinder is made in halves and held together by brass bands, top and bottom. For the purpose of printing, the tracing to be reproduced is laid on sensitized paper and both are wrapped around the cylinder with the tracing next to the glass. The upright at one of the joints in the glass carries some horizontal flat steel springs, to the ends of which vertical strips of wood are attached, which act as clamps to hold the first edge of the tracing and sensitized paper. The tracing and printing paper are held in place by a fabric curtain, one vertical edge of which is permanently secured to the upright at one of the joints in the glass. To the free edges of the canvas are attached, by tension springs, a number of hooks which hook over a metal rod on the upright at the opposite joint in the glass. The spring hooks insure an even pressure everywhere and give the best conditions for securing contact. Tracings that have been folded and badly creased can, with a little care, be made to come down to excellent contact. The arc lamp is then lowered slowly, the center of light coinciding with the axis of the cylinder, so as to maintain a uniform intensity of light at all points of the tracing on a level with the arc. As the light descends through a distance corresponding to the height of the tracing all parts of the sensitized paper are equally affected.

HOMOGENEOUS metallic lead is deposited from slightly acid concentrated solutions of lead nitrate or acetate, containing, for preference, considerable quantities of the corresponding alkali salts, by a current of about .024 ampere per square inch at the cathode. It appears that when an anode of lead is used, the electro-motive force is about 0.1 volt. When the conditions are such that lead hydroxide can be formed at the cathode, spongy lead is deposited. Concentrated solutions of lead or alkali salts dissolve considerable quantities of lead hydroxide; when such a solution is electrolyzed, the removal of lead from the layer of solution in contact with the cathode dilutes it. This more dilute solution deposits the lead hydroxide or basic lead salt which it contains on the cathode, and so prevents the regular deposition of the metal, giving rise to the spongy deposit. Lead chloride and sulphate give unsatisfactory results, owing largely to the formation of insoluble lead chloride or peroxide at the lead anode. By using very small current densities and electro-motive forces, it is, however, possible to obtain coherent deposits. The deposition of lead may be utilized for plating objects with lead or for separating lead and silver, the alloy being used at anode in a solution of nitrate saturated with chloride; the silver remains behind undissolved. Coherent deposits of lead are also obtained, although with more difficulty, from alkaline solutions. The concentration of the lead ions is so small in these solutions that the liquid surrounding the cathode soon becomes so impoverished that the electro-motive force rises, and the next available cation (an alkali metal) is discharged. This results in the secondary reduction of lead sponge. By keeping the electro-motive force low, and replacing the liquid in contact with the cathode by vigorous stirring, however, good deposits may be obtained.

Direct Cyaniding of Wet-Crushed Ores in New Zealand.*

By HAMILTON WINGATE, B.Sc., Auckland, N. Z.

Until recently, the universal practice in New Zealand was dry crushing and direct cyaniding. With ores containing no mineral sulphides, and little or no coarse gold, this method, in spite of its many disadvantages, gave excellent results, and was by far the best available one, pending the solution of the slimes problem. But the situation has now been changed. The successful treatment of the slimes, enabling the mines not only to do away with dry crushing, but also to deal with the mineralized ores of the lower levels, which are, for obvious reasons, quite unsuited to that method of treatment, has made wet crushing universal; and this may be taken as satisfactory proof of its superiority over the former practice.

In the lack of accurate information from plants operating successfully, particulars of experimental trials carried out on a working scale at the Waitekauri Extended mine, Maratoto, N. Z., while the writer was in charge of the cyanide works, may be interesting to members of the Institute.

At this mine the usual method of kiln drying, dry crushing and subsequent cyaniding, for which the plant had been specially designed, was the system in vogue; but while the extraction was high, the working costs were heavy; and the treatment, though applicable to the oxidized surface ores, was not suited to those of deeper levels. The ore being, moreover, of low grade, a change of treatment became imperative. The experiments here described were consequently made after such alterations in the plant as was necessary and practicable.

The choice of a satisfactory process depended on the successful treatment of the slimes, which formed a large proportion of the ores crushed, and, as was subsequently discovered, also contained the larger part of the total value. The use of lime, successfully introduced on the Rand by Mr. Williams, was found to satisfy this condition; and the results, in view of the somewhat refractory nature of the ore, are interesting.

NATURE OF THE ORE.—The ore is an extremely hard, flinty, bluish quartz, intermixed with finely divided iron pyrites, the gold contents being pretty uniformly distributed in an excessively fine state of division, and silver being present as sulphide. Analysis showed the quartz to contain 5% of iron pyrites, with traces of calcium and manganese, the average value being from 6 to 8 dwt. of gold and 1 oz. 15 dwt. of silver per ton of 2240 pounds. The high cost for shoes and dies, as shown in the table of working expenses below, will convey some idea of the very hard nature of the ore, which, owing to the fine state of division of the gold, had to be crushed through a 40-mesh screen in order to secure an adequate extraction. A prolonged amalgamation test on a large amount of ore gave a very small percentage of the total hullion contents. This being the case, and as the ore carried no visible gold, any attempt at amalgamation was discarded.

The association of the gold and silver contents with the mineral sulphides of the ore is shown by the two following experiments:

A. Seventy-two pounds of blanketings, obtained from 7.5 tons of ore, crushed through a 40-mesh screen, assayed as follows per ton:

	Oz.	Dwt.	Gr.
Gold.....	1	11	0
Silver.....	3	8	14

B. Clean mineral, obtained from the concentration of a large tonnage of slimes in the main slimes launder, assayed as follows per ton:

	Oz.	Dwt.	Oz.
Gold.....	4	18	0
Silver.....	10	12	8

This raised the question whether concentration would be necessary; but after experiments, both in the laboratory and on a working scale, it was decided to classify the pulp into two classes only, namely, sands and slimes.

The largest proportion of the mineral sulphides in the ore crushed to slimes. This accounts for the higher value of the hullion contents of the slimes as compared with the sands.

After cyanide treatment of the sands, average samples of clean mineral, obtained by concentration from the residues, assayed as follows per ton:

	Oz.	Dwt.	Gr.
Gold.....	0	4	21
Silver.....	1	6	2

This shows a high extraction from the contained mineral sulphides. In experimenting on the mineral concentrates in the laboratory it was not found possible, even by using a solution of higher strength, to get the residues below 4 dwt. per ton in gold without first crushing them finer.

With reference to the mineral contents of the slimes one of the initial difficulties was the tendency of the mineral sulphides to separate out during agitation and settle on the bottom of the vat. These assayed as follows per ton:

Before treatment:

	Oz.	Dwt.	Gr.
Gold.....	1	7	18
Silver.....	5	9	10

After treatment:

	Oz.	Dwt.	Gr.
Gold.....	0	9	18
Silver.....	2	17	4

Experiments showed that the poor extraction was due to want of proper agitation. It is essential that the agitators be so constructed that when in motion they will sweep the bottom of the vat perfectly clean. The agitator adopted consists of a central revolving shaft, which can be raised or lowered as required, and carries two parallel fixed wooden arms, set 3 feet apart, the lower arm reaching within 9 inches of the bottom of the vat. Holes are bored through the arms at regular intervals of 6 inches, and wire rope (some old $\frac{1}{2}$ -inch aerial cable being used), cut into 5.5-foot lengths, was passed through them and keyed into position, the ends next the bottom of the vat being teased out so as to act as a sweeper.

This was an effective agitator. The assays of the mineralized portion of the slime residues, in two successive charges, were as follows per ton:

Charge No. 1:

	Oz.	Dwt.	Gr.
Gold.....	0	2	10
Silver.....	1	6	2

Charge No. 2:

	Oz.	Dwt.	Gr.
Gold.....	0	2	0
Silver.....	1	2	10

These results show a good extraction from the contained sulphides.

GENERAL DESCRIPTION OF THE TREATMENT.—The mortar boxes which had the double discharge for dry crushing were altered to single discharge for wet crushing; but even after this change were obviously unsuited to the work. This fact, no doubt, increased the percentage of slimes; but it was found in actual practice much easier to get a good extraction from the slimes than from the sands. A number of sizing tests on the sand residues showed that the greater part of the gold which they retained was in finely divided form in the coarser quartz particles.

The ore was crushed through a 40-mesh screen. The classification of 656 tons crushed gave 355 tons, or 54.11% of sand, and 301 tons, or 45.89% of slimes. A sizing test of the sands taken through this period gave the following:

Mesh.	Through.	On.	Per Cent.
40.....	50.....	6.9	
50.....	60.....	9.4	
60.....	70.....	27.5	
70.....	80.....	8.7	
80.....	90.....	29.4	
90.....	100.....	1.9	
100.....	Loss.....	15.0	
		1.2	
		100.0	

It thus appears that, taking the sands and slimes together, 70% of the pulp, on an average, was crushed fine enough to pass through the 80-mesh sieve, this being the fineness, as determined by experiment, requisite for a good extraction.

The crushed pulp passed direct from the mill to a spitzkasten, 5 feet square at the top, coming to a point 5 feet deep, and provided with a 2.5-inch cock at the apex to regulate the discharge of the sand pulp. A rose, connected with a 1.5-inch high pressure pipe, is passed down the center of the spitzkasten to within a few inches of the bottom, the inclined sides only of the rose being perforated. When the spitzkasten is at work, this throws an upward spray of water under pressure.

The success of the treatment depends largely on good classification, since any slimes carried over with the sands are apt to be lost in the overflow from the sand vats; while, on the other hand, any fine sands present in the slimes will cause a portion of the slime pulp to set hard at the bottom of the vat in a mass too tough to be affected by the agitator. There is in this case a consequent loss in the ultimate cyaniding through non-treatment. It was only on the addition of the rose to the spitzkasten that a satisfactory separation was obtained.

The resulting products were treated quite separately. The discharge from the spitzkasten passed to a sand vat, where it was discharged through a Butters distributor; and the overflow of the spitzkasten, constituting the corresponding slime charge, passed to one of the agitator vats.

TREATMENT OF THE SANDS.—The average charge was thirty tons, the vats being circular, 20 feet in diameter and 4 feet deep. The sands were treated in the ordinary way, after a preliminary alkaline wash according to requirements, followed by a wash from the "No. 2 weak" sump, in order to reduce the initial consumption of cyanide on the first contact of the strong solution with the ore. A 0.5% solution of cyanide for the dissolution of the gold and silver contents was followed by the usual washes from the strong and weak sumps, with a final water wash to displace the cyanide solution. The sands being a perfectly clean, uniformly leachable product, quite free from slimes, presented no special difficulties in treatment.

TREATMENT OF THE SLIMES.—The slime vats were circular, 22 feet in diameter and 7 feet deep, and the average charge (corresponding to a 30-ton charge of sands) was twenty-five tons of slime per vat. The overflow from the spitzkasten being carefully run in at one end of the vat, the clear liquid was allowed to flow away at the other; and when the vat had been charged the slimes were allowed to settle and the water was drained off by means of an inside syphon pipe, leaving a pulp which contained, after draining, from 42% to 58% of dry slimes. The agitator was now started, being at the same time gradually lowered. The value of the charge was ascertained by means of dip samples, taken during agitation, which we found to give most accurately the value of the total hullion contents. Lime was now added in sufficient quantity to coagulate the slimes (fourteen pounds per ton of dry slimes being the average amount required), and the charge was agitated for an hour to neutralize the effects of the free acid and other "cyanicides" present in the ore.

In order to economize cyanide and prevent the volume of the sump solutions from becoming unmanageable (our sump accommodation, during these experiments, being limited), the amount of dry slimes and of water in the pulp was carefully estimated in the sample of the slimes charge, and the required amount of cyanide, dissolved in five tons of No. 1 "strong sump," was added, in order to bring up the total solution present in the charge to 0.16% of cyanide. This strength of solution, found in actual practice necessary for the effective solution of the gold and silver, was higher than the preliminary laboratory experiments had indicated. These, however, were not made under exactly similar conditions. The charge of slimes pulp, which occupied a depth of from 3 feet to 4 feet in the vat, was now agitated at the rate of forty revolutions per minute for three hours (the time necessary to obtain a satisfactory solution of the hullion contents); solution from No. 1 strong slimes sump was then pumped on, and agitation was continued until the slimes charge was complete, the pulp now occupying a total depth of 6.5 feet. The agitator was now raised and the slimes allowed to settle, after which decantation began.

The arrangement for drawing off the cyanide liquors consisted of a 2-inch wired rubber hose, fixed inside the vat, and connected at the bottom and close to the side of the vat with the solution pipe to the extractor boxes. The end of the hose is held firmly in an iron collar, to which is attached an arm of $\frac{1}{2}$ -inch square iron. This arm passes through a guide, which can be moved freely along a $1\frac{1}{2}$ by $\frac{3}{4}$ -inch iron bar, 3 feet long, which is bolted to the inside edge of the top of the vat. A thumbscrew through the guide holds the arm in position; and, as the hose is lowered, the guide can be moved along the fixed iron bar and the arm securely clamped. When not in use the arm is raised and clamped, and the hose, being drawn up close to the side of the vat, is clear of the agitator.

Since there was no intermediate storage tank, and the solutions had to be drawn off direct from the vats to the extractor boxes, this was found to be the safest arrangement. Care was taken not to set the mouth of the hose too close to the level of the slimes, as on draining off, the pressure of the top solution being removed, they rise. Automatic floats were found unsatisfactory, as they were both difficult to adjust and required a considerable amount of watching; while, with the arrangement described, once the hose pipe is properly set, it only requires lowering occasionally, and there is no risk that slimes will pass along with the liquors into the extractor boxes. After drawing off the first wash, agitation with sump solutions, followed by decantation, was continued, until a satisfactory extraction was obtained. Additional lime was added, if required; but the preliminary coagulation was usually sufficient.

From four to eight washes was required, according to the size of the charge and the nature of the slimes pulp, which was at some time more hunky than at others. The total weight of the washes required was from three to four times that of dry slimes present in the charge.

Each wash was in every case passed through the extractor boxes before being returned to the slime vats. The precipitation was satisfactory even in the most dilute solutions. The rate of flow through the extractors was regulated to two tons of solution per hour per cubic foot of zinc shavings.

The following is a summary of the results obtained during the experiments, on a working scale, upon 1440 tons of different classes of ore, taken from the mineralized portion of the reef at the lower levels.

SUMMARY OF WORKING RESULTS.—REPORT No. 1.—During the period from August 27 to October 4, 1900, quartz from the north end of the Low level only was crushed, the ore being, as already described, extremely hard, and containing 5% of finely divided iron pyrites. The amount of ore crushed was 656.1 tons.

CLASSIFICATION.—The separation by the spitzkasten was as follows:

355 tons passed to the sand vats = 54.11%.
301.1 tons passed to the slimes vats = 45.89%.

656.1 tons.

The total gold was divided as follows: In the sands,

46.9% in the slimes, 53.1%. Of the total silver, 41.28% was in the sands and 58.72% in the slimes.

EXTRACTION.—The following tables show the extraction:

GOLD.														
	Tons of 2240 lbs.	Total Gold.			Gold Per Ton.			Gold in Residues.			Gold Per Ton.			Percent- age Extrac- tion.
		Oz.	Dwt.	Gr.	Oz.	Dwt.	Gr.	Oz.	Dwt.	Gr.	Oz.	Dwt.	Gr.	
		107	9	21	.....	6	1	25	8	13	.....	1	10	76.55
Sands.....	355	121	13	23	.....	8	2	17	1	18	.....	1	3	86.08
Slimes.....	301.1													
Total...	656.1	229	2	20	.....	6	23	42	10	7	.....	1	7	81.43
SILVER.														
	Tons of 2240 lbs.	Total Silver.			Silver Per Ton.			Silver in Residues.			Silver Per Ton.			Percent- age Extrac- tion.
		Oz.	Dwt.	Gr.	Oz.	Dwt.	Gr.	Oz.	Dwt.	Gr.	Oz.	Dwt.	Gr.	
		477	12	8	1	6	21	262	3	20	.....	14	18	45.11
Sands.....	355	679	3	22	2	5	3	375	2	8	.....	1	22	44.78
Slimes.....	301.1													
Total...	656.1	1156	16	6	1	15	6	637	6	4	.....	19	19	45.03

the actual hullion yield to be about 3% lower than that indicated by assay.

EXTRACTION.—The following tables show the extraction:

GOLD.														
	Tons of 2240 lbs.	Total Gold.			Gold Per Ton.			Gold in Residues.			Gold Per Ton.			Percent- age Extraction.
		Oz.	Dwt.	Gr.	Oz.	Dwt.	Gr.	Oz.	Dwt.	Gr.	Oz.	Dwt.	Gr.	
Sands.....	393	135	9	14	.....	6	21	33	19	5	.....	1	17	75.1
Slimes.....	390.8	153	17	3	.....	7	17	29	6	23	.....	1	12	80.5
Total..	783.8	289	6	17	.....	7	9	63	6	4	.....	1	14	78.5
SILVER.														
	Tons of 2240 lbs.	Total Silver.			Silver Per Ton.			Silver in Residues.			Silver Per Ton.			Percent- age Extraction.
		Oz.	Dwt.	Gr.	Oz.	Dwt.	Gr.	Oz.	Dwt.	Gr.	Oz.	Dwt.	Gr.	
Sands.....	393	526	7	9	1	6	18	291	1	17	.....	14	19	44.7
Slimes.....	390.8	831	19	15	2	2	13	515	18	3	1	6	9	38.0
Total..	783.8	1358	7	0	1	14	15	806	19	20	1	0	14	41.2

WORKING COSTS.—The working costs for milling and cyaniding are included in the cost sheet for the total 1440 tons treated.

REPORT No. 2.—During the period from October 4 to November 22, 1900, two different classes of ore were crushed, namely:

I. 467.9 tons from the north end of the Low level, the nature of the ore being similar to that dealt with in the last report, and having an average value of £1 10s. 10d. per ton.

CLASSIFICATION:

245 tons passed to the sands vats = 52.34%.
222.9 tons passed to the slimes vats = 47.66%.

II. 315.9 tons from the south end of the Low level, the nature of the ore being much softer, more mineralized, and showing a greater tendency to crush to slimes, and having an average value of £2 3s. 9d. per ton.

CLASSIFICATION:

148 tons passed to the sands vats = 46.86%.
167.9 tons passed to the slimes vats = 53.14%.

The classification for the total 788.8 tons of ore crushed was as follows:

393 tons passed to the sands vats = 50.26%.
398.8 tons passed to the slimes vats = 49.74%.

783.8 tons.

Of the total gold, 46.9% was in the sands and 53.1% in the slimes.

Of the total silver, 38.8% was in the sands and 61.2% in the slimes.

It will be noticed that the extraction during this period was lower than that shown in Report No. 1. In the case of the sands this was found to be due to the retention of a larger proportion of the gold in the coarser quartz particles, owing to the richer nature of the ore from the south end. In the case of the slimes, the unexpectedly increased quantity to be dealt with, and the more highly mineralized nature of the ore, made this product more difficult to treat. The lower extraction of silver, which is intimately associated with the contained mineral sulphides, as compared with the sands extraction, was due to imperfect agitation, owing to the increased amount of slimes produced from the south end ore, which contained a greater proportion of associated mineral sulphides.

The crushed ore was sampled before entering the spitzkasten, as a check against the sands and slimes samples. All the sands and headings samples were ground in a Park-Lacy fine crusher to an impalpable powder before assay. The final cleanup showed

WORKING COSTS.—The working costs for both periods under review, during which a total of 1440 tons of ore were treated, are embodied in the following table. Water power is in use at this mill, but owing to a shortage, due to dry weather, the item for wages is higher than would otherwise have been the case; because, during a part of the time, it was possible to run only ten stamps out of the total number of twenty which had been altered for wet crushing.

COST OF TREATMENT OF 1400 TONS OF ORE.

	S.	D.
Cyanide, 2.7 pounds per ton.....	3	4½
Zinc, .75 pounds per ton.....	0	4½
Caustic soda, .75 pounds per ton.....	0	1½
Lime, 7 pounds per ton.....	0	2½
Milling and cyaniding wages.....	2	5
Filter cloths.....	0	0½
Screens.....	0	0½
Shoes and dies.....	0	6
Oils.....	0	1½
Assaying and melting.....	0	7
Management.....	0	7½
Sundries, including royalty.....	0	3
Total cost per ton of 2240 pounds.....	8	7½

The necessity of using stronger solutions, owing to the nature of the ore, and in order to obtain an adequate extraction of the silver (which is an important part of the total hullion value), makes the consumption of cyanide on these ores a good deal higher than the general average.

CONCLUSIONS.—In view of the foregoing results it is doubtful if the higher extraction which could be obtained by concentrating out and treating separately the mineral sulphides from both sands and slimes would compensate for the extra working costs which such a treatment would involve—to say nothing of the initial expenditure which would be necessary. Otherwise, this would seem at first sight to be the ideal method of treating such an ore. Several of the mills here crush with a cyanide solution of about 0.1%, thus obtaining a rapid solution of the hullion contents during crushing, sometimes amounting to as much as 60% of the total value of the ore; but owing to the difficulty of preventing a large consumption of cyanide when the ore is mineralized, this method of treatment was not tried in the case here discussed.

THE Consolidated Copper Co. of Virginia has incorporated at Pierre, S. D., under the laws of that State. Of its six incorporators, four are New York men. It is asserted that the new concern with such pretentious capital is formed to compete with the

Amalgamated Copper Trust, and that it represents the Heinze and the Boston interests in copper. F. Bien, the chief incorporator, is attorney for the defendants in the litigation of E. R. Morse, the Boston millionaire and once head of the copper trust, and the Boston & Montana Ore Purchasing Co.

The Silver King Concentrating Mill, Park City, Utah.*

Written for the MINING AND SCIENTIFIC PRESS by
JAMES H. STEELE, E. M.

This mill, which handles the lower grade ores from the great Silver King mine, has now been in operation about three years. After a two weeks' unsuccessful run as first built, the mill was closed down and very extensively remodeled. Many additions and changes have since been made to bring it up to its present form.

The mill has a capacity of about 100 tons in ten hours, and at present is being run nineteen hours out of every twenty-four.

The ores treated carry about 15% lead, twenty ounces silver and small amounts of gold. The lead occurs both as a sulphide and as a carbonate; the silver occurs associated with the galena and also as a chloride. The carbonates and chlorides, which slime very badly, constitute the difficult feature in the successful concentration of the ore. The gangue material is principally quartzite, with some lime.

The crude ore is stored in bins having a capacity of 2000 tons, from whence it is drawn into a car by one man on each shift and dumped over a grizzly, the oversize going through a 10x7 jaw crusher which reduces it to about walnut size.

From the bin under the grizzlies the ore is fed automatically by a plunger feeder into a trommel having ½-inch punched screens, and then to a pair of 12"x30" belt-driven rolls. The product from the rolls, together with the unders from the screen, is elevated and again screened in ½-inch trommel; the overs are returned to the rolls for recrushing, while the unders pass on to be screened to the size for jigging.

In describing the process of concentration, we may, for convenience, divide the mill into three parts—the coarse concentrating department, the fine concentrating department and the slime and dryer department.

The jig, or coarse concentrating department, is built in duplicate, only one-half being run at a time. It is so arranged that with very little work, changing the launders, etc., parts of one-half may be made work with parts of the other half, thereby saving shut-downs for repairs.

The ore is sized for jigging by a set of three revolving screens. The first screen has ⅜" holes and the overs are treated on two double-compartment Hartz jigs. These jigs make 140 1" strokes per minute. They are fitted with a side discharge, all of the other jigs having the regular bottom discharge. The second screen has ⅝" holes, and the corresponding jig makes 180 ⅔" strokes per minute. The third screen has ¾" holes and the jig a stroke of ⅓", making 240 per minute.

The unders, or fines, from the third sizing screen are settled in a small hydraulic sizer, and the spigot product from this tank is jigged on machines having a stroke of ⅓" and 270 per minute. The overflow from the tank contains in suspension in the water a greater portion of the slimes and is sent to the slime department.

The tailings from the first and second sets of jigs are wasted; those from the others are recrushed and made ready for the fine concentrating department. These tailings are first elevated to a small bin in which a paddlewheel slowly revolves and pushes the coarse particles over the side into a second bin, from which the Huntington mills are fed. The slime water runs off in the opposite direction and is sent to the storage tanks in the slime department.

At the head of the fine concentrating department is a battery of four 5-foot Huntington mills wherein the jig tailings are crushed to pass through a diagonal slotted screen equal to about 25-mesh. As a general thing, two of the mills are sufficient to handle all of the tailings that are re-treated. There is an overhead track with crawl and chainlocks, so that the mills may be easily picked up and run into the machine shop for repairs.

The pulp from the Huntingtons is elevated and sent to a V-shaped hydraulic classifier, about 60' long, situated above the concentrating tables. The coarse product from the first compartment is treated on six Wilfley tables and the fine stuff from the last compartments is treated on four Frue vanners.

An Overstrom diagonal table has been installed, but it is yet too early to make any statement as to its performance. When rich enough to pay, the Wilfley slimes are saved and filtered.

Next in order comes the slime department. Here canvas tables and other settling devices have been unsuccessfully tried on these flourlike slimes. A complete new slime plant has been recently installed. It consists of a 40 H. P. Ingersoll-Sergeant air compressor, three large steel mud and air receivers and two 48-chamber filter presses. These presses run

*See illustrations front page.

about fifteen tons each of slime in twenty-four hours. One man on each shift looks after the presses and compressor, the latter running only about one-third of the time.

The slime water which has been taken from the ore at various points in the process is divided up among seven V-shaped settling tanks, 5' high by 5' wide and 40' feet long. The flow through them is very slow and the water comes off almost perfectly clear. The thick mud is tapped at the bottom through molasses gates and elevated to a storage tank over the filter presses. It is run through the receiver into the press until the latter is full and the former nearly so. Ninety pounds of compressed air are then used to force the remainder of the mud into the presses and the water out through the canvas. The water leaves the presses absolutely clear. About 22% moisture remains in the slimes after pressing. The slimes average in value about 15% lead, twenty-five ounces silver and \$2 gold per ton.

In order to sample the mill concentrates and slimes in the company's new automatic sampler, they must be dried to about 3% to 5% moisture. This is being done in a Cummmer revolving drier. The cylinder of the drier is 48" diameter by 25' long and can be made to revolve at two different speeds necessary for the different materials dried. The dust is collected in two hopper-bottomed chambers, one at the top and one at the side of the cylinder. The slimes are put through a chopping machine before drying, and the dust is fed into this machine with the slime cakes to keep the knives clear and to prevent the pieces of slime from sticking together again on their way to the dryer. The dry product is sent to the bin to be hoisted to the sampler.

Power for the mill is furnished by a 200 H. P. cross-compound Corliss engine. An auxiliary 125 H. P. tandem-compound engine drives a 500-lamp generator which furnishes light for the entire plant. The two boilers are fed by two American stokers, the coal being fed into the stokers from a pocket in the roof.

A close check is kept on the mill work; from twenty to thirty samples from all parts of the mill are assayed daily. The heads and tails are sampled by means of an automatic sampler. In the case of the heads the sampler is placed after the second screen, before any water has been added to the ore. The launder carrying the stream of ore is broken, allowing the latter to fall through an open space. A shallow pan, mounted on a trolley, is made to pass through the stream, diverting its entire volume to a second launder for a short space of time—probably four seconds—and at whatever intervals of time necessary for accurate sampling, the latter depending upon the mesh of the ore. The operating mechanism of the sampler consists of a water box 6' long, 8' wide and 8' high, having one compartment on each side of the center where the box is pivoted. The box can be fixed either over or under the sampler. A rope from each end of the box connects with the trolley. A small stream of water is made to fill one side of the box, causing it to tip and slowly empty and draw the sample pan through the stream of ore. As the box tips the other compartment is brought under the water jet and the machine is ready for a similar operation in the opposite direction.

A sample is taken every two hours. One thousand grams are taken out and weighed, dried over night, reweighed and the moisture calculated. These samples are thoroughly mixed and cut down by means of rifles for the assay sample.

The tailings are sampled by a similar device. In this case, however, a smaller sample is taken every fifteen minutes, which is run into a pointed canvas bag to drain.

The ratio of concentration is three tons into one.

SUNLIGHT is a variable quantity. Outside the atmosphere the sun would appear conspicuously blue. On the meridian the sun gives light that is white; but, as it declines, the atmosphere steadily filters out the blue and violet until by the middle of the afternoon the entire blue end of the spectrum is down to about half its previous intensity, while the general luminosity has fallen only about 20%. The general color tone is then distinctly yellowish white, and still later in the day when the sun is only a few degrees from the horizon, the blue contingent is practically wiped out, and the light shades off from orange yellow to orange red.

THE illustrated article in the issue of Sept. 27th, showing the novel use of a rock drill as a steam hammer in Colorado, elicits a statement of a rock drill mounted on a platform to drill horizontal holes in granite sills of windows in the United States Treasury Building, Washington, D. C., and also for similar use in that city for drilling out brick.

Power Required for Isothermal Compression.

Written for the MINING AND SCIENTIFIC PRESS by D. E. BIGELOW.

Illustrating the use of the graphic table shown on this page, let us suppose 1600 cubic feet of free air per minute at sea level (60° F. and 14.7 pounds absolute) is to be compressed to seventy pounds gauge pressure: Follow the line indicating 1600 cubic feet up to its intersection with the diagonal line representing seventy pounds gauge, and note the horizontal line cutting this point. Follow this line to the left margin of the diagram, where it will be found to indicate 180 H. P., which is the power required for compressing 1600 cubic feet free air per minute to seventy pounds gauge, with the air at a constant temperature (60° F.) and with no allowance for losses of any kind.

These conditions are theoretical. In practice, an additional amount of power is required above that shown by the diagram, varying with the temperature of the air and character of the compressor. Additional power will be required, first, to overcome the friction of the moving parts; second, to draw the air into the compressor; third, to overcome the expansion of the air due to its being heated by the compressor. That is, it is impossible with any compressor now known to maintain the air at a constant temperature during compression. The air is expanded by this heat, and its pressure increased until, after leaving the compressor, its volume is reduced as the temperature is reduced to that required. This loss is minimized by two-stage compression, having efficient intercoolers. The combined loss of power from these causes is rarely less than 10%, varying from that to 40%.

The temperature of the air has also to do with the power required. As compared with the table, more power will be required if the temperature is above 60° F. and less power if below, amounting to about 1% for each 5° difference in temperature. Atmospheric air is denser at the sea level than at an altitude, hence a compressor working at an elevation

can be compressed at any altitude may be determined and compared with sea level conditions.

The History of a Catalogue.

NUMBER I.

Written for the MINING AND SCIENTIFIC PRESS by CHAS. H. FITCH.

Britain is a tight little island, and its history begins when people came there and began doing things. America was discovered by the people who use dictionaries, and they began to make its history. But where does the history of France begin? It had an indeterminate beginning. What changing boundaries of territory, what gradual emergence of power from weakness, what mergers of dialect into language took place! Finally, there is the nation, an unquestionable unified fact, by whatever gradual process it may have come to be.

In writing the history of a catalogue we have a subject which is not only as indefinite as France in its beginnings, but one which remains indefinite, which has not arrived at any strong definable character. My idea of what a catalogue should be is so far removed from what catalogues are that I might hesitate to advance it were the subject better defined, but I will let it serve for one idea of a catalogue.

After a manufacture has been established it is necessary to give inquirers a catalogue, properly speaking, of the products of manufacture. To convey information necessary to be known in the course of business is the object. "A straight tale speeds best being plainly told," and simple form, correct specification and full information make such a catalogue admirable for its purpose. This full information should include prices, without which a catalogue is as incomplete as a shipping manifest presented to a man who wants an itemized bill.

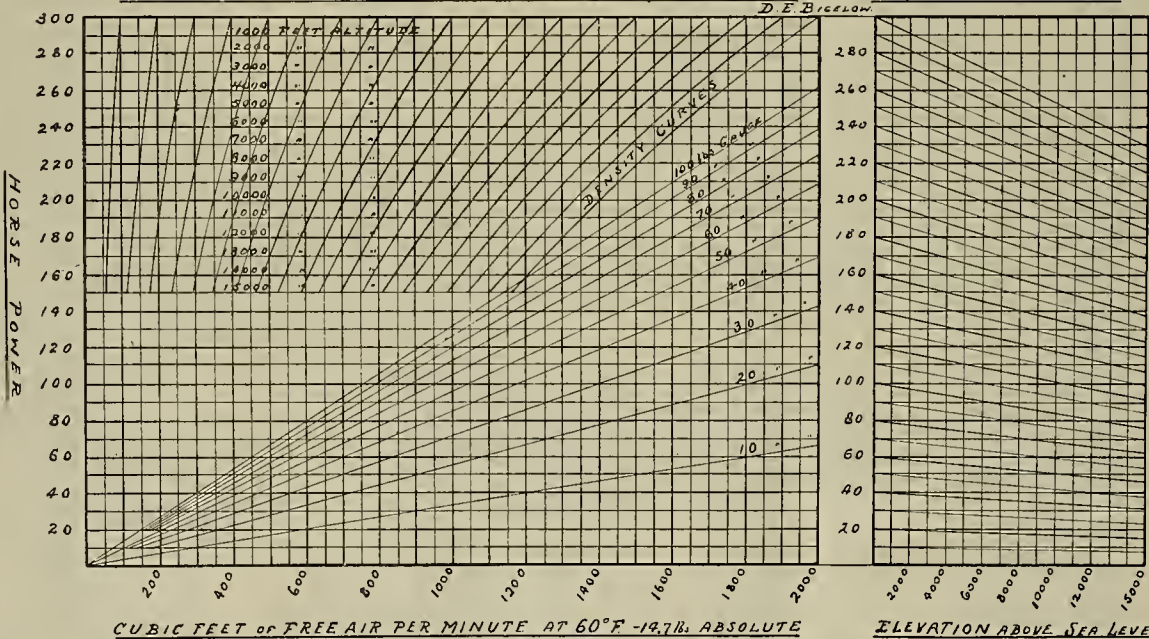
I am a stickler for clear analysis—as clear in the details of business as it must be clear in the calculation of a bridge truss. But a bridge may be built and carry heavy loads without having this construction. It may be of a design called hasty, that cannot be

COMPRESSED AIR

THEORETICAL POWER REQUIRED FOR ISOTHERMAL COMPRESSION

NOTE: FOR SINGLE STAGE COMPRESSION ADD 20 TO 40%. FOR TWO STAGE COMPRESSION ADD 10 TO 30%.

VOLUME OF FREE AIR AT VARIOUS ALTITUDES COMPARED WITH QUANTITY AT SEA LEVEL—14.7 lbs. ABSOLUTE. COMPARATIVE POWER AT VARIOUS ALTITUDES



must expand a portion of each stroke in bringing the air to sea-level pressure.

Supposing the compressor to be located 5000 feet above sea level, it will have a less capacity than at sea level. To ascertain how much, follow the vertical line indicating 1600 cubic feet to the top line of the diagram. From there follow the density curve to its intersection with the horizontal line denoting 5000 feet altitude, and it will be seen that the 1300 cubic feet line intersects at this point, showing that the compressor which has a capacity of 1600 cubic feet at sea level has a capacity of but 1300 cubic feet at 5000 feet altitude.

It requires less power to compress the lighter air. To make the power correction for altitude in the above case, follow the horizontal line indicating 180 H. P. to the smaller diagram to the right side of table. Follow the diagonal from 180 down to its intersection with the 5000-foot vertical line, and note the horizontal line meeting at this point indicates 165 H. P., which is the power required to compress 1600 cubic feet free air at 5000 feet altitude to seventy pounds gauge, subject to correction for frictional and heat losses as shown above.

It will readily be seen that the table may be used as well in calculating the reverse problems—that is, starting with known power the amount of air which

well calculated for its stresses, and is not held in good repute by bridge engineers, and still stand up. Catalogues, as they are born and grow, are usually many purpose productions. They are not clean cut and suited to definite ends, but are vaguely designed and used.

The trade list or catalogue proper need not be hideous. It may be very handsome. I have at hand the last catalogue issued by the M. C. Bullock Co. before that company was merged with the Sullivan Co. It is a good example of a proper catalogue. Any one wanting diamond or rock drills can see at a glance that it is meaty, gives explicit information on equipment, details and prices—answers his questions in advance. Yet it is an elegant publication. The catalogue of the Clark hose coupling is quite a booklet, but it is all legitimate catalogue, showing a new device by many illustrations, and convincing a person (as far as pictures can do it) that the coupling is "quick as a wink" and reliable under trying applications. This is proper, but brevity and simplicity are strong points in such a catalogue.

A preacher who was caught breaking his own code of morals blandly assured his complaining flock that they should follow what he said and not what he did. If circumstances are at times too strong for the weak natures of those who preach religion and morals,

what can be expected of hirelings who have the nerve to preach ideal catalogues? Gen. Francis A. Walker remarked in one of his lectures on political economy that Italy had produced some of the best writers on finance because Italian finances had been so bad as to give them many wholesome lessons. If I am not a good writer on catalogues, it is not from any lack of experience with faulty ones. I have helped to bring out some that I would have cheerfully kicked over at the time, or in the light of later experience, but I did not want to be more nice than wise. Preach wisdom, I say, and be mindful of what light of truth you can get on a cloudy day; but if you attempt too sweeping an extinction of folly, you will be likely to find yourself standing alone and friendless, as roundly disliked as Joseph among his brethren.

The birth of the customary catalogue is in this wise: A man or company having built up a business by other advertising methods decides that it needs a catalogue to help maintain and increase the business. It is the advertising idea that prevails. Here there is a tremendous amount of delusion. Incidentally, a catalogue helps to hold trade just as good goods, prompt shipments and courteous attentions hold trade. It is in fact, properly speaking, an expanded letter of explanation to a man whose interest has been aroused, or whom you have found to need your goods. But it is an exceedingly ineffective and expensive means of reaching new and original business.

The idea which prevails in bringing out the catalogue is 10% information to customers to lighten the burden of correspondence. This I consider legitimate. It is 30% advertising, which is ineffective, or calls for a different type or means of publication. This leaves a main motive of 60%, which is the conceit of a man who wants to do something himself that he does not know how to do well, and is too timid to do openly. The dear thing about it is that it is his own, not that it is profitable for the extension of business, but that it exploits among rivals and friends a business institution behind which is a personality. For example, the former promoter of the Willans engine in America, a gifted engineer who desired and richly deserved the good opinion of his fraternity, published a handsome catalogue. He sent a copy to every member of every leading technical society. It was a creditable thing and I do not think he regretted the expense, but he told me that he did not trace a single sale to this distribution.

Where we know a party uses a product, and we send him a catalogue, it would appear to be a judicious thing. It sometimes is. But I know of one case of a manufacturer of an ingenious specialty in brewers' machinery who sent out 5000 catalogues in English, and over 1000 went abroad, largely to non-English speaking countries. Then he sat back and waited for something to happen. He had gone with a brewers' machine to a world of brewers. After a few months he figured up his responses: From America, none; from Hungary, a post card, probably from a competitor.

Now for the shyness of it. The personal note is a muffled one. I sometimes think it would be a more interesting world if it were less so. A gentleman much cleverer than ordinary once asked me to help him make a trade catalogue in which his portrait and an original poem by himself were to occupy the front cover. It was a good poem, too, as poems go, but I told him as tactfully as I knew how that it would contribute more to the "gaiety of nations" than to the sale of machines. I did that because I had been brought up in a timid atmosphere. I was wrong. I should have helped it along. I have helped worse things along.

The first chapter in the history of the catalogue is the plan of it, the idea of what it should be and accomplish. If we are after personal credit, trade advertisement and information to established customers in about the order stated, it is the first point in economy to reach these ends in the most effective way. The economy of production, cost of composition, illustration, printing and distribution of the catalogues will be reviewed in later articles. These are as the iron and tool work in a machine. It is not these, but the effectiveness of design of a machine for its purposes which determines whether it shall be valued in the shop or consigned to the scrap heap.

(TO BE CONTINUED.)

How to Save Life.

The following simplified method for the restoration of drowning persons, and of those whose have lost consciousness through asphyxia or any other cause, was developed by Dr. J. V. Laborde, of the School of Anthropology in Paris. It has proved efficacious in many cases. In one cited, of a child who had been submerged for nearly fifteen minutes, the return of breathing was accomplished in ten minutes. The translation here given is from a leaflet which Dr. Laborde distributes among his pupils, and its publication is believed to be timely:

1. As soon as the drowning man has been taken from the water, force open his mouth. If the teeth are clenched, separate them with the fingers, or by means of any hard object—e. g., a piece of wood, the end of a cane, the handle of a knife, or a fork.

2. Firmly seize between the thumb and the first finger of the right hand the end of the tongue, using your handkerchief, or any piece of linen, to prevent

the tongue from slipping; then repeatedly, rhythmically, and with decision, pull it from the mouth, and relax it alternately—at the rate of least twenty times a minute, imitating the cadenced movement of expiration and inspiration.

3. At the same time introduce, far back into the throat, the first finger of the left hand, pressing upon the base of the tongue, so as to induce vomiting, and thus free the stomach of the water or food which encumbers it.

4. This treatment, the most efficacious known method of bringing back the respiration, must be begun without the slightest delay, and persistently continued for a half-hour, an hour, or more. At the same time all the usual remedies must be applied. Most important are the removal of the clothes, friction over the whole body, pressure upon the interior part of the chest, the restoration of the bodily heat, and, where it is possible, the application upon the region of the heart of compresses of very hot water.

The same method may and should be applied, in the same manner, in all cases of asphyxia and of syncope (loss of consciousness), from whatever cause.

The Gold Production of North America, Its Geological Derivation and Probable Future.

NUMBER III.—CONCLUDED.

A fourth and last class of veins which produce gold are those of Tertiary, mostly post-Miocene, age, and which usually are found cutting heavy andesite flows, more rarely rhyolite and basalt, in regions of intense volcanic activity.

These veins in Tertiary lavas have certain characteristics which have caused the belief that they form a fairly well defined class. They are called propylitic veins, alluding to the peculiar alteration of adjoining rocks which seems to characterize them. The ores are nearly always quartzose and sometimes contain silver alone, more rarely gold, but most commonly both gold and silver in about equal quantities by value.

They are often characterized by great richness, the word bonanza being first coined to represent their big ore shoots. Aside from enriching surface processes, the greatest values appear to occur not far from the surface. The gold is nearly always in such peculiarly fine distribution that extensive and rich placers are rarely formed from them, contrasting in this respect against conditions in the Pacific gold belt. Many of them, in districts of great erosion, show that the values continue in depth, but perhaps less rich than those parts formed nearer to the original surface. For in this class we evidently have to do with the part of the vein which was not far from the original surface at the time of ore deposition. In some cases the ores can be proved to have been formed but a few hundred feet from this surface. Instead of roots of veins, as in the Pacific and Appalachian belts, the propylitic veins represent the uppermost part of the area of deposition along the fissure. While some of these veins yield steady and reliable products, many of them burst out in sudden blazes of glory, like stars, only to be equally suddenly extinguished.

This belt of propylitic veins is most extensively developed in Mexico. The central plateau contains the great silver veins of this class which always contain a small amount of gold, and from which the greater part of Mexico's gold output has been derived. But along the western slope of the Sierra Madre in Chihuahua, Zacatecas and Sinaloa the heavy andesite flows contain gold-silver veins of great importance, and, together with the veins of the older belt in Sonora, are largely responsible for the greatly increased gold production of Mexico.

Entering the United States, the propylitic veins are found in Arizona and New Mexico. In Arizona probably both Cretaceous and Tertiary veins occur, but their separation is not always easy in the present state of our knowledge. The Commonwealth mine in Cochise county is a prominent representation of the propylitic class. It breaks through rhyolite and is at present one of the largest producers of the Territory. One-third of the value is gold and the rest silver.

In New Mexico are several districts containing these veins, chiefly, it is said, in andesitic rock, but the output of this Territory has not yet reached the million dollar mark.

The propylitic veins of Arizona continue northward into Nevada and California. San Bernardino county in California contains silver deposits in rhyolite and probably also Tertiary gold veins. Veins of similar kind continue along the eastern foot of the Sierra Nevada as far north as Alpine county and become most productive in Mono county. The mines at Bodie in andesite produced in nine years \$12,000,000 gold, besides much silver.

Going northward from this point, the propylitic veins disappear for long distance, though the volcanic activity along the Pacific has been great during the Tertiary. Only at one place in Oregon, in the Bohemia district in the Cascade mountains, the volcanic rocks contain gold veins, but they have not as yet yielded much. Continuing northward into Washing-

ton, the Monte Cristo veins, in andesite and diorite, represent this type, but are not credited with extraordinary production.

No veins of this class are thus far known from British Columbia or the Northwest Territory, but in the Alaskan southern coast we meet sporadic cases again.

Returning again to Arizona, we trace its propylitic vein northward into Nevada, and here we find this class abundantly represented. The Comstock vein, Tuscarora, Eureka, Tonopah, the DeLamar veins, all are known or believed to be of propylitic character, and, with the exception of the latter, occur in volcanic rocks. The Comstock easily leads with an estimated production of over \$140,000,000 in gold, and the other districts have contributed heavily to the total output, although all contain much silver in their ores. The production of Nevada has fluctuated greatly and after long declines is again increasing.

A line of propylitic veins continues northward from Nevada into Idaho. In the southern part of that State they are represented by the Owyhee gold and silver mines, which, since their discovery, have yielded \$12,000,000 in gold, and farther north by the bonanzas of Rocky Bar, Atlanta and Custer. Still farther north is the Thunder Mountain district, which, if reports are reliable, contain gold in rhyolite. But as far as known they do not extend farther north.

In Utah veins of this class occur, for instance, in the Horn Silver mine, and at Tintic, but these deposits carry very little gold.

Returning now to New Mexico, the propylitic veins continue from that Territory up into Colorado, and here reach a development not known elsewhere except in Mexico. The total output of Colorado is upward of \$230,000,000 and but little of it has resulted from placer mining. In 1900 the output was \$28,900,000. Excepting the Leadville deposits, the principal gold producing districts are of Tertiary age. Oldest among them as to discovery are the veins of Gilpin, Boulder and Clear Creek. These districts have been remarkably steady producers since 1859 and contribute annually about \$3,000,000. They promise to continue in the same way for a long time. The next region is the San Juan district in southwestern Colorado, where strong quartz veins cut heavy andesitic flows. The yield has increased greatly since 1890 and in 1900 reached \$4,000,000. It promises well for the future and some of the mines, like the Camp Bird, have proved veritable bonanzas. The output will probably continue to increase for some years.

Finally there is the great Cripple Creek district, which since 1892 has yielded \$77,300,000, and during 1899 \$18,000,000. The network of veins occur in andesite, phonolite and underlying granite and have thus far chiefly carried telluride ores. A most important question, and one not easy to answer, is what may be expected of this district in the future? While recognizing the difficulty it would perhaps seem admissible to express a belief that the highest mark has nearly been reached.

North of Colorado the propylitic deposits are almost absent, though they appear in sporadic form in Montana.

Roughly calculated, about \$337,000,000 has been contributed by the propylitic veins to the total gold output of the United States, to which should probably be added \$200,000,000 from Mexico. For 1900 we may estimate \$35,000,000 as the output of these veins in the United States and perhaps \$7,000,000 in Mexico. Summing up the data obtained, we should estimate as follows:

	Total.	1900.
Pre-Cambrian.....	\$ 144,000,000	\$ 4,000,000
Cretaceous (Pacific).....	1,400,000,000	50,000,000
Cretaceous (Central).....	310,000,000	18,000,000
Tertiary, propylitic.....	537,000,000	18,000,000
Totals	\$2,391,000,000	\$90,000,000

The output of the pre-Cambrian veins will probably continue steady for many years. Owing to gradual exhaustion of northern placers (if no new important finds are made) the output from the Pacific Cretaceous belt will probably decrease. California may be expected to hold her own for many years and increase is probable in Idaho and Oregon. The central Cretaceous veins may be expected to hold their own, except if for some reason the copper and silver industries should decline.

Most difficult to calculate are the probabilities of the Tertiary propylitic belts. While the violent fluctuations in the Cretaceous Pacific belt are due to placer discoveries, those in the propylitic belt are caused by discoveries of vein bonanzas, and these cannot be foreseen. Another Cripple Creek may well be discovered. The new Tonopah camp of Nevada belongs to this class and may be expected to swell the product of Nevada for 1901. Much is expected of Mexico's future gold product and the rapid increase bids fair to continue for the next few years. Regarding the output from the propylitic veins in the United States a decrease is probable, if no new discoveries are made.

THE eighty-third meeting of the American Institute of Mining Engineers will be held at New Haven, Conn., beginning Tuesday evening, October 14.

Oil Process for Ore Concentration.

Under date of Sept. 29th is received a report from G. A. Ohren, consular agent at Rossland, B. C., wherein he says that a new process for concentrating ores by the use of oil is being introduced there by the Canadian Ore Concentration of London.

The ores of the mines in that vicinity contain gold, copper, silver and lead. Ore from a property on the British Columbia coast, containing 2.2% of copper, showed by water concentration a loss ranging from 30% to 58.6%, mainly arising from float mineral, the surface of the water being covered with a scum of metallic mineral which would not sink. By the oil process the loss was 7%, extraction 93% of the assay value. The process is described as follows:

"The ore having been reduced to a freely flowing pulp (oil and suitably pulverized ore) passes directly from the mill into the open end of a horizontal rotating drum, inside of which is fixed a helix with cross blades or buckets which lift up the pulp to a certain height and drop it again, at the same time propelling it forward to the opposite end of the drum, thus keeping the pulp in constant agitation for the few seconds which are occupied in its passage. With the pulp is also admitted a small quantity of thick, sticky oil, known as summer drak oil. This is of course subjected to the same agitation as the pulp. It picks up and holds the mineral that is floating about or suspended in the pulp in minute particles, and does not appear to have any effect upon the particles of rock with which it comes in contact.

"The oil and pulp automatically discharge from the other end of the drum into a pointed box, or spitzkasten, in which the tailings or rock at once settle down and pass off with the water at the bottom, while the oil floats up to the top and carries with it practically all the values which the ore contained. From the top of the pointed box the oil, with its mineral, flows off into a specially constructed centrifugal machine, where the oil is extracted from the mineral and is at once ready for reuse.

"For close extraction, three mixing cylinders are sometimes used, the pulp passing from one to the other and receiving fresh streams of oil. A second centrifugal machine is also found desirable below the first, to further extract the oil and water from the concentrates. The concentrates are left in the machine practically free from oil.

"The process was first tried in the laboratory, then on a small working scale, and then with a plant erected at Gladsir mine, Wales, capable of treating about fifty tons of ore per week. After a lengthened trial of this plant it was replaced by a much larger one, which treats 250 tons per week. The tests gave a recovery by oil of 90%.

"A plant of four units, capable of treating 100 tons of ore per day of twenty-four hours, costs f. o. b. London, exclusive of power plant and crushing apparatus, \$10,706. The crude petroleum residuum, of which little is lost, costs only a few cents per gallon, according to place of delivery. The cost of working the plant necessarily varies according to the locality and local conditions, but in many cases will be very moderate, comparing favorably with water concentration. It is proposed to grant licenses for the use of the process, and to fix charges at a low rate on the product of the ore treated or on each unit of plant.

"The oil so far found most suitable for the purpose of oil concentration is known in the trade as summer drak oil (Pennsylvania). Its specific gravity is 0.885, its flash point 0.46 to 0.48, its cold test 0.45 to 0.5, and its viscosity at 100° F. in 200 seconds, with a given viscosity, the lower the specific gravity the better.

One unit* costs about.....\$1700
Separators cost..... 2200

"A set of separators is sufficient for four units; a set of four units, to treat 100 tons per day, would cost \$6800, which, with the separators, would make a total of \$9000.

"As an instance of the commercial utility of the process, the results obtained from ore from one of the best known mining properties in Canada—the Le Roi—may be cited. The treatment of the dump ore, containing one-half of 1% of copper, showed that about fifteen tons could at a small cost be concentrated into one ton containing 6% of copper, together with a high recovery of gold and silver.

"A report issued last December gave the cost of smelting Le Roi ore as \$6 per ton—I believe it is about \$4.50 per ton at this date—and as, by the use of this process, only one ton out of fifteen would have to be smelted, the saving is self-evident.

"It is said that plants have been ordered for mines in England, Wales, Sweden and Norway.

"The process appears to be specially applicable to low-grade sulphide ores, especially such as have a tendency to slime when crushed, and for treating tailings from richer ores. Experiments seem also to have demonstrated the feasibility of separating, at a small cost, sulphides, such as copper pyrites, from oxides, such as magnetite, etc.

"For further information parties interested should write to M. T. Wigham, 826 Salisbury House, London Wall, E. C. The process is patented in the United States and Canada."

*One unit deals with twenty-five tons per every twenty-four hours.

The Cripple Creek Reel.

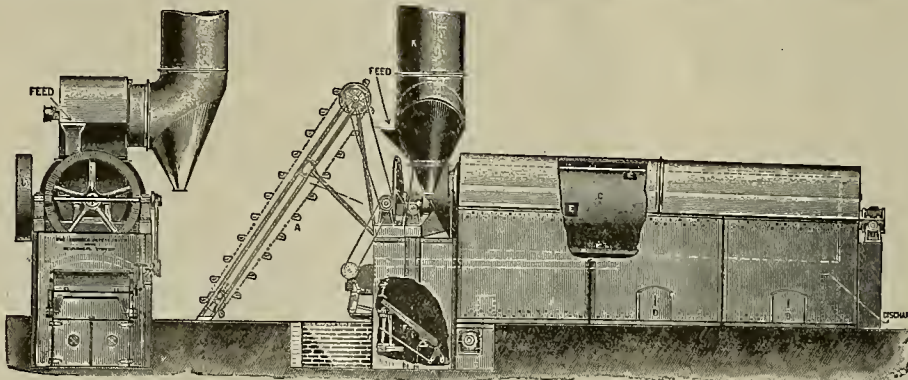
The Cripple Creek reel, illustrated herewith, is a newly patented device for holding engineers' long steel band measures. The short chain or steel tape held horizontally for engineers' and surveyors' field



The Cripple Creek Reel.

measurements has been largely superseded by the long, narrow steel tape, usually 500 feet, the long, accurate measure with the vertical angle and calculation for the horizontal and vertical co-ordinates doing away with plumb bobs, pins and leveling. The method of slope measuring is more accurate, requires less time and less assistance and carries the vertical distances accurately without the use of a level or level rod.

A drawback to the use of the long tape has been the want of a satisfactory reel. The long steel tapes are necessarily light and narrow, a width of even $\frac{1}{4}$ inch being objectionable in the wind, aside from its weight. Most steel measuring tapes of 500 feet or more in length are from $\frac{3}{16}$ to $\frac{1}{8}$ inch in width. With such tapes, or even to a width of $\frac{1}{4}$ inch, it is not always practicable to wind on a reel in a single section, like the ordinary method with pocket tapes, for



The Cummer Patent Mechanical Stoker.

a greater length than 300 feet. Beyond this length a tape must be wound promiscuously on a wide spool. The winding presents no difficulty, but when, as most commonly is the case, only a portion of the tape is required for a measurement, the portion remaining on the reel manifests a tendency to uncoil in a clock spring fashion as soon as the reel is laid upon the ground or the operator's tension is otherwise relaxed. To prevent this uncoiling by the tape's own elasticity numerous devices have been used. Most of these devices consist of either a stop or a brake to prevent the spool from turning, or a framework to prevent the uncoiling steel band from escaping from the spool. But neither of these prevent the steel tape itself from partially uncoiling and tangling, the difficulty occurring when the rewinding operation is begun.

The Cripple Creek reel applies a rolling friction to the tape only. The reel always remains free to wind or unwind with ease; the resistance is applied only to the uncoiling tendency of the steel band. Thus the man in charge of the reel may leave it lying loose upon the ground or hung upon a limb of a tree, while the man at the end of the tape pulls out as much as

may be needed. Then the rewinding is effected without delay or annoyance.

The reel is light, compact, durable and in good shape to be carried by a shoulder strap and used by a transit man without removing from the body.

It was designed and patented by two practical field engineers, J. E. Chapson and V. G. Hills, and is furnished by them at Cripple Creek, Colo.

Refrigeration by Compressed Air.

A writer in the National Engineer, in connection with cooling water by means of compressed air, says the cold, expanded pipe should only be led through a pipe or coil of pipe dipped into the water to be cooled, then exhausted into the atmosphere, and recalls a fact of personal experience when in charge of some tunnel work. A ventilator fan blowing fresh air to the front was actuated by a small steam engine working with compressed air, the exhaust of which was led into a closed chest containing tin tumblers filled with water. On its way to the discharge orifice the current of escaping air was passing along the row of tumblers, and some ten to fifteen pounds of ice were thus daily made quite readily. The miners felt interested in the progress of the refrigeration, and the men of the outgoing shift would seldom fail to dip a dusty finger into some of the tumblers, whose main peculiarity was the existence of a black core at the center of the block of ice.

The air which has done expansive work behind a piston moving in a cylinder escapes at a low temperature and at a moderate speed, and is fit for use as a refrigerating agent. In the air which is simply released through a valve the whole expansive work is converted into velocity and almost instantaneously transformed into heat by friction with the surrounding atmosphere or against the neighboring bodies. The result is that no cold can practically be produced in this manner.

Besides, the use of an expansion cylinder coupled to the compressing cylinder reduces to a minimum the actual amount of work required by this process of refrigeration. Its efficiency is low, and it is not economical on a large scale, as compared with the ammonia process; but it possesses advantages of simplicity, of cheapness and of safety which in many cases will make it quite valuable.

Self-Contained Dryer.

The F. D. Cummer & Son Co., Cleveland, Ohio, manufacturers of the Cummer dryer, have recently put upon the market what is called the Cummer self-contained dryer. The dryer is enclosed in a steel casing, the sides of which are lined with firebrick. The cover is of steel, protected from the heat by fireproofing. The Cummer patent mechanical stoker is shown in the accompanying illustration, but the furnace can be arranged for any type of grates for burning any kind of fuel. The dryer is shipped complete in every particular, and can be erected in a very short time. A feature about the Cummer self-

contained dryer is that no piece or part is extraordinarily heavy, and the dryer can be dismantled and moved from one place to another when occasion demands it. This type of dryer is used for drying coal, stone, marl, clay, slag, ores, concentrates, slimes and many other materials. It is made in a number of sizes, and can be supplied on short notice and at low prices. Mention is made of this dryer in an article on the Silver King mill, Utah, on page 204.

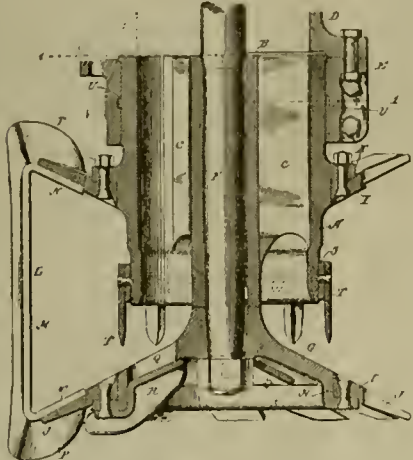
NORTH AMERICA is to be spanned by another railroad. This is to be known as the Trans-Canada line, and is to be north of the Canadian Pacific. It is to run from Quebec, on the St. Lawrence, to Port Simpson, on the Pacific, and will evidently be shorter than either the other Canadian line or than any one of the United States' five transcontinental roads. The plan is to run the road from Quebec almost north to Lake St. John, then a little north of west to James Bay; and from that point the general direction, allowing for occasional short detours made necessary by the conformation of the country, will be westward through the Peace River valley, and over the Pine River pass to Port Simpson.

Mining and Metallurgical Patents.

Patents Issued September 30, 1902.

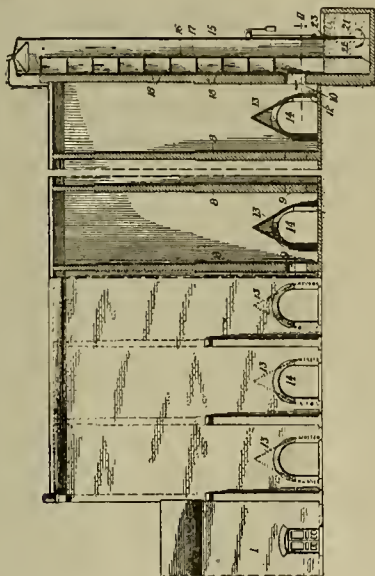
Specially Reported and Illustrated for the MINING AND SCIENTIFIC PRESS.

CUTTER HEAD FOR HYDRAULIC DREDGERS. — No. 709,861; L. W. Bates, Chicago, Ill.



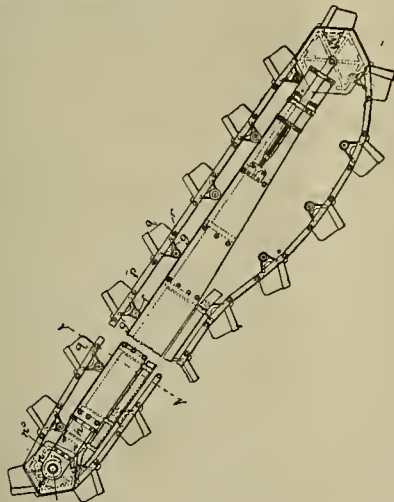
In combination with hollow cutter head, provided with outwardly extending rim or flange; driving shaft extending therethrough and secured to head; conical disk G secured to lower end of shaft; rings I', I attached to cutter head and disk respectively, rings being provided with outwardly extending lugs; and series of cutters attached to lugs.

FUME ARRESTER. — No. 709,896; A. W. Gilliland, St. Louis, Mo.



Fume arrester, comprising chamber divided into compartments by transverse partitions, openings in partitions at alternately opposite ends, cooling passage in each compartment communicating at each end with external atmosphere, cooling tower communicating at upper ends opening below into tank, vertical series of superposed screens in one passage, means for spraying water down each passage.

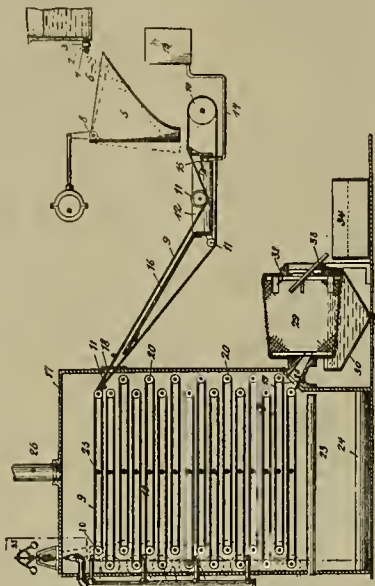
DREDGER AND EXCAVATOR. — No. 710,054; I. B. Hammond, Portland, Or.



Combination with dredge ladder of tumblers for dredge chain, consisting of two side plates having

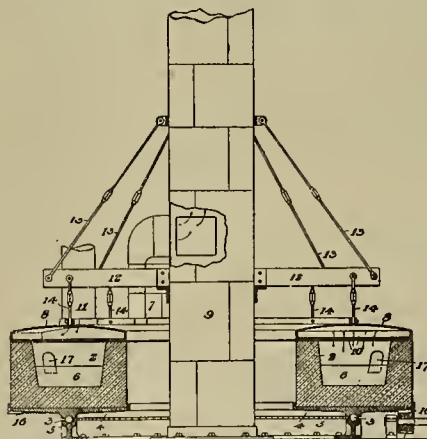
projecting ledges on inner faces, providing interrupted, narrow rims on which to receive dredge chain, leaving space between such rims for carriers to pass through; endless dredge chain and buckets; traveling carriers therefor attached below chain, narrowed toward base, so that such carriers in width occupy only portion of space within span of buckets; railed way extending length of upper surface of ladder leading from and to tumblers; railed way extending from upper tumbler along under surface of ladder for part of its length, being disconnected at convenient point allowing enough of dredge chain and buckets at lower end of ladder to hang free, to provide sufficient drag; guard for holding chain carriers traveling along railed way on under side of ladder against lateral thrust or strain.

APPARATUS FOR PRODUCING WHITE LEAD. — No. 709,954; J. W. Bailey, Jersey City, N. J.



Apparatus for making white lead or similar products, combination with corroding chamber, means for supporting and moving carrier, feed chute to feed comminuted lead to carrier, chute being adapted to rock on pivot, means for rocking chute, means for comminuting lead and feeding it into feed chute, bath provided with moistening agent through which carrier moves before passing into corroding chamber so as to wet comminuted lead, means for supplying suitable corroding gas to chamber, one or more traveling carriers for lead in chamber adapted to receive lead from first carrier, means for supporting and moving carriers in chamber.

METHOD OF TREATING MATTES. — No. 710,300; J. A. Potter and W. C. Harvie, Monterey, Mexico.

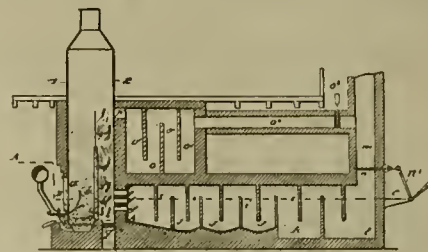


Method of treating matte, consisting in exposing surface of bath of liquid matte to action of air blast, breaking up crust which forms on surface of bath, bringing fresh portions of bath into position to be acted upon by air, subjecting second bath of molten matte to similar operation, supplying heat from second bath to first bath while latter is in later stage of desulphurization.

ELECTROMETALLURGIC TREATMENT OF ORES OF COPPER OR OTHER METALS. — No. 710,346; C. J. Tossizza, Paris, France.

In electrolytic decomposition of impure solutions obtained by roasting sulphide ores and dissolving products of such roasting, process of recovering metal from solution without preliminary treatment to remove another metal or other metals present therein, consisting in introducing sulphurous acid from roasting operation into electrolytic bath, while at the same time adjusting voltage in such manner as to effect decomposition of salts of metal to be recovered and not of other metals present in solution.

FURNACE FOR SEPARATING ZINC FROM ORES. — No. 710,217; A. M. G. Sehillot, Paris, France.



In furnace for extracting zinc from ores, combustion chamber divided into front and rear compartments adapted to hold ores to be treated, and charcoal, respectively; air-blast pipes communicating with front, compartments connected by openings in their division wall, condensing chambers connected by suitable openings with upper and lower portions of rear compartment of furnace.

Removing Oil From Exhaust Steam.

TO THE EDITOR:—What is the best way to remove oil from condensed exhaust steam? Water is scarce here and we are compelled to save all possible. Is it necessary to use a filter to extract the oil? G. F. L.

Ludwig Mine, Yerington, Nev., Sept. 30.

You could use a filter, but if not convenient a home made device can be made and rigged up on the spot which may answer. It is to be used where the returns come through steam traps. Get three whisky barrels and connect them by 1½ or 1½-inch pipe, as shown in the sketch. The drips from the traps flow



Simple Apparatus for Purifying Oily Feed-water.

into barrel No. 1. The barrels are open at the top, as no pressure is carried in any of them.

When all the barrels fill to the water line indicated the oil and scum will be taken off by the overflow pipe B. If enough water does not come from the drips to keep the barrels filled to the water level, the deficiency is supplied from the cold water pipe C. By opening the valve A, barrel No. 1 can be drained out, and also any oil and scum that has worked through into barrel No. 2 will run out through the pipe connection into No. 1. The cold water feed will then wash out barrel No. 1. Valves may be put in the bottoms of barrels Nos. 2 and 3 to drain them completely, but they are not absolutely necessary.

Gold on Hand and to be Produced.

George E. Roberts, Director of the United States Mint, says that the output of the Transvaal mines this year will probably be about \$35,000,000, and that it may be expected to increase, as laborers can be obtained until it reaches and perhaps even exceeds the rate of production maintained when the war broke out, which was about \$100,000,000 a year. He is of the opinion that the production in North America this year will be larger than ever.

Mr. Roberts says that the total stock of gold in the world in monetary use is estimated as about \$5,000,000,000, but the total amount actually held as bank reserves is only about \$20,000,000,000. He says that a large portion of the new gold must be added to the bank reserves. He adds that although the first effect may be to lower interest rates, it is a well-known fact that low rates of interest tend to advance the value of all dividend-paying properties and stimulate speculation until the surplus reserves are exhausted. He further states that the permanent result is not a lower rate of interest, but higher values for properties.

In his opinion, this country is entering upon a period during which wages and all fixed payments will have a declining value, as compared with properties. He adds that to what this tendency may be modified, as it was in the 1850 to 1860 period, by the new uses for gold and in the rehabilitation of the monetary system and in the industrial development of hitherto backward countries, remains to be seen. With a total production of \$350,000,000 per annum, probably \$250,000,000 would, in his opinion, be available for monetary use, or about one-eighth of the sum now in the world's bank reserves.

THE American Smelting & Refining Co. paid dividend No. 13 of 1½% quarterly on the preferred stock on the 7th inst.—\$875,000; total since incorporation, \$8,891,553 on the preferred stock. No dividend has yet been declared on the common stock, all the earnings being absorbed by the interest guaranteed on the preferred stock. Shares of the latter are selling for \$96 and of the common at \$46.

Mining Summary.

Specially compiled and reported for the
MINING AND SCIENTIFIC PRESS.

ARIZONA.

COCHISE COUNTY.

Regarding the Cananea, Yaqui River & Pacific Railroad, Epes Randolph says two corps of surveyors are near Cochise, making the last survey, and work will be commenced at the end of this week. Ties and rails are already on the ground. Surveyors are also in the field north of Cochise, and it is his desire to extend the line north to Clifton as soon as possible. From that point the Durango and Clifton survey would be followed until the road tapped the coal fields of Colorado. He says that when the Cananea, Yaqui River & Pacific Railroad was organized it was with the intention of connecting the coal fields of Colorado with the mining districts of southern Arizona and northern Sonora. This is the ultimate object of the road. The first part of the road will be built from Cochise to Naco and then from Cochise to Clifton. Eventually the line will be extended from Colorado to the coast.

W. F. Staunton at Tombstone has men cleaning out the old workings on the 600-foot level and connecting them with the new shaft. Sinking will be resumed.

The Copper Queen M. Co. at Bisbee employs between 1400 and 1500 men. The mines are operated through five shafts, the Czar, Holbrook, Spray, Gardner and Lowell.

At Benson the Empire smelter will be ready to blow in Jan. 1.

GILA COUNTY.

V. V. Clark is at Pinto building a concentrator for the Pinto Creek M. and S. Co.

At Globe, Superintendent G. S. Andrus of the Globe-Boston G. M. Co. has resumed work. The shaft on the Mallory mine now 200 feet down, will be sunk 250 feet farther.

GRAHAM COUNTY.

At Clifton, the September copper product of the Shannon is reported to have aggregated 450,000 pounds.

MARICOPA COUNTY.

Wickenburg reports ore entered in the 300-foot level of the Oro Grande, proving the continuity with another 100 feet of depth of the ore shoot.

In the San Domingo district the Maricopa G. Co. has three dry concentrators of 4, 6 and 9 H. P., run by gasoline engines.—The White Cloud has started sinking its main shaft.—The Trilby and Exposition claims are being worked.—H. LeRoy is developing the Judge Ainsworth property.—H. E. Armitage has a diamond drill exploring the Hercules property in the San Domingo section east of Morristown.—Cox & Snyder have bought one-third interest in the Gilbert-Scott-Rowe property, 11 miles east of Morristown.

A strike is reported in the Poland-Nelson mine, Greenlee district; a shaft sunk, 100 feet, all in ore; a crosscut run 14 feet without reaching the wall; samples of the crosscut give 8% copper, \$7 to \$14 in gold and 6 ounces silver.

MOHAVE COUNTY.

F. Stull, superintendent Lucky Boy mine, is getting out ore in the 400 level. The crosscut on the 500 level has not yet reached the vein.

On the 300, 400 and 500 levels of the Elkhart mine men are stoping out ore. The Miner says negotiations are under way for the sale of the mine to E. T. Loy.

The Miner says the Leland-Mitchell Co. has laid out a millsite on the Arizona side of the Colorado river, to be used contingently on the failure of the promoters to build the railroad from the main Santa Fe to the mines. The company will build a line of road from the mines to the river if the other line does not go in, and will then erect the mills on the mesa close to the Colorado.

A carload of iron ore from Cerrillos, New Mexico, for flux is at the Chlorides smelter.

PIMA COUNTY.

The Santa Rita M. & W. Co. is incorporated at Tucson. The company is composed of San Francisco men with S. L. Kingan, of Tucson, to work the placer gold fields in the foothills of the Santa Rita mountains. They propose to take water from reservoirs in the Santa Rita mountains and pipe it for 9 miles to the ground.

The Blanco property is sold to Pennsylvania men; consideration named in deed, \$60,000. It is in the Arivaca district, 70 miles south of Tucson, and consists of a group of three claims—the Oro Blanco, Parallel and Extension. It is a low-grade gold proposition; the ore is free-milling. Considerable development work has been

done on the different claims and a body of ore 12 feet in width opened up. The ore is said to average \$20.

PINAL COUNTY.

The Copper Hill M. Co., 4 miles from Oracle, will build a traction engine road to the nearest railroad station, 24 miles, and propose to put in a leaching plant of 100 tons daily capacity.

SANTA CRUZ COUNTY.

At Douglas the Phelps-Dodge Co. is putting in a plant to handle the product of the smelters. A copper wire and sheet copper works will handle the output of the smelters; instead of shipping the converter product to eastern refiners it will be separated and treated there.

Nogales says much interest is manifested in the reported discovery of the lost Tumaneacari mine, on the southwest slope of the Santa Rita mountains. The opening was covered by heavy timbers. The first level was explored 175 feet and shows galena-silver ore.

YAVAPAI COUNTY.

At Butte, Mont., it is reported that while the apparent cause of the indefinite shutdown of Senator Clark's United Verde property at Jerome was the fire in the mine, in reality the entire force of miners had made preparations to strike, but were anticipated by Manager H. J. Allen, who discharged every one of the employees except a few guards.

On Mount Union E. E. Bread has the Vermont group, averaging \$12 in gold and \$18 in silver. Mount Union is the center of Yavapai's water supply.

The Oriental Co. has finished its 20-stamp mill below Poland, Big Bug district. It will handle the product of the Postmaster mine.

On the Planet-Saturn claims in Fools gulch, under the superintendency of W. A. Clark, a test run of 1000 tons of ore is being made to give a thorough and practical test pending its sale to Eastern men. No particular place in this property is furnished the ore and no special assorting of the same is permitted. If the sample run is a favorable one in value, it means the outlay of considerable money. The new company behind the Fools gulch project have bonded the Yarnell, the Herndon & Norris and twenty-five other claims, all the available mining ground between Yarnell and Fools gulch. The same company is also operating in the Bradshaw.

The Blue Bell M. Co., E. A. Haggott, superintendent, has adopted the code of mine bell signals now in operation in California and Colorado.

Recently the United Verde Copper Co. handed to the county treasurer \$28,000 tax money and asked for a receipt. They were tendered a receipt which read "on account." A receipt in full was asked for and refused and the \$28,000 was redeposited in the Bank of Arizona. Under the last assessment the total amount of taxes asked from this company is \$48,000.

In the Cypress mine, on Big Bug, recently sold to G. H. Middleton for \$75,000 one shaft, well timbered, is 260 feet deep; three others are 60 feet. The values are principally gold and copper.

Superintendent Brooks of the Bannie G. M. Co. has a body of ore on the 100-foot level. From a prospect winze, south of the new working shaft 216 feet, at a depth of 40 feet, the ore 5 feet wide carries values of \$30 per ton.

YUMA COUNTY.

(Special Correspondence).—The Valenzuela property has again started up after a shutdown of about three weeks. Mr. Deidesheimer of Denver, the treasurer of the company, is in charge during the absence of Colonel Dick Darling.

The Goodenough group, which C. Eichelberger and J. Rivers have been developing during the last three years, has passed into the hands of a company organized in Los Angeles. These properties give excellent indications of developing into a mine.

The Guadalupe Co. are down 350 feet with their deep shaft. They intend to go at least 500 feet. Considerable ore has been encountered in sinking.

Considerable interest has been aroused in camp over the number of companies being incorporated, none of which are working, and in a number of cases the properties are unknown.

The dry washers here are turning in considerable gold. Nearly all are working in good pay.

Quartzite, Oct. 1.

CALIFORNIA.

ALPINE COUNTY.

The Standard Electric Co. have subscribed \$900 for construction of a wagon road from Markleeville to Blue Lakes, provided Markleeville and Alpine county will contribute a like amount or sufficient to complete it.

AMADOR COUNTY.

The Jackson Ledger reports that the

Amador Phoenix has suspended operations.

Grading for forty stamps at the Kennedy is completed, and excavation for twenty more stamps is being pushed. This will give a total milling capacity of 100 stamps. The new hoist, by hoisting four tons at a load, could supply the 100 stamps crushing from 400 to 500 tons per day from the one hoist.

The Mitchell mine is idle, the company being in debt for wages and supplies to the amount of about \$4000. It is expected, however, that everything will be straightened out and the property started.

The Central Eureka paid a dividend of 2 cents per share in September, aggregating \$8000. The Alma M. Co. levied an assessment of 5 cents per share.

At the Edinburgh mine a strong flow of water necessitates additional pumps.

BUTTE COUNTY.

At Nimshew the Bay Counties Power Co. has several crews at work on the dam. The Emma mine, G. L. Smith, superintendent, is washing good gravel. The Butte Star mine, owned by Wilson & Williams, is also washing good gravel.

The Miller mine at Forbestown is to resume.

The Morris Ravine mine has changed hands, is to be reopened and men be put to work at once. G. W. Kimble of El Dorado will have charge. W. W. Mason has been superintendent for the past six years.

The Gold Bank mine, near Forbestown, which was shut down two months ago, has resumed operations with twenty stamps dropping continuously. H. P. Stow is manager and has thirty men at work.

At Forbestown the Denver mine is taking out ore; the 10-stamp mill is running day and night; thirteen men take out a ton of sulphurets a day, besides the free gold that is obtained. M. E. Smith is superintendent.

CALAVERAS COUNTY.

The Melones mill is dropping sixty stamps and is putting in sixty more. The Angels Record says the Utica mill is now dropping 240 stamps, and that each stamp reduces to pulp six tons of ore per day, which seems large duty for a stamp. The Angels mine is dropping twenty stamps on good ore. The Oriole mine is putting in twenty stamps.

The Magnet asserts that about 700 men are employed in the mines and mills of Angels.

DEL NORTE COUNTY.

There are many deposits of black or magnetic sand in this county, and attempts have been made with varying success to extract the gold. The beach along Crescent bay for several miles is rich in deposits of gold-bearing sand. H. Buergermeister of San Francisco is installing an extensive plant 2 miles from Crescent City. Messrs. Lauff, Rice and several others have a sand mine; they recently sent a sample to the Department of the Interior and received a report as follows: "Its initial weight was fifty six ounces; separated into a magnetic portion weighing thirty ounces and non-magnetic portion weighing twenty-six ounces, the magnetic portion assayed 320 pounds of nickel to the ton and the non-magnetic portion contained only a small amount of platinum; but the assay gave gold values of \$978 26 per ton for such concentrates. I return herewith the gold, and enclose in this 14 cents in currency, which is the value of the nickel at 47 cents per pound."

[Signed]

DAVID T. DAY,
Chief of Division."

EL DORADO COUNTY.

The New Manzanita M. Co. has levied an assessment of 2 cents per share, delinquent Nov. 5.

The Larkin M. Co. has levied an assessment of 2 cents per share, delinquent Nov. 1.

KERN COUNTY.

Sweet & Relley have made twelve placer continuous locations on Kern river, between Bodfish creek and the South Fork of Kern river. The old Keysville placer mines are adjacent, also French gulch, where a French company spent \$50,000 but failed owing to too much water. The Power Co.'s canal will be 30 feet wide on the bottom and has twenty times the fall of an ordinary irrigating canal. It will take all the water in the river for ten months in the year. The company has bought off every one who has any water rights and can take all the water. A dredging company was formed several years ago to mine this portion of the river but did not succeed owing to presence of boulders. Sweet & Relley will mine the river bed and bars adjacent.

The Randsburg Miner says: The Butte Lode M. Co., at the Red Dog mill, got \$5000 from ninety-one tons of ore.

Four hundred and ninety-three cars of ore are dumped into the 100-stamp mill of the Yellow Aster Co.; each car holds from 2000 to 2300 pounds.

MONO COUNTY.

J. L. Wedekind has bought the Golden Gate mining property, near Coleville, and will spend the winter in developing it.

Superintendent Nelson, W. H. Thomas, consulting engineer British Columbia C. Co., and W. Davidson of Salt Lake, Utah, are examining the property of the Goleta Co. at Jordan.

NEVADA COUNTY.

Near west Grass Valley L. Williams, Superintendent Niagara mine, is sinking a double compartment shaft, now down 135 feet.

The new pump for the central shaft of the North Star mines has a direct vertical lift of 1400 feet.

J. A. Bunting has incorporated to work some old properties near Nevada City.

PLACER COUNTY.

A shipment of 500 sacks of copper ore was forwarded recently from the Copper Point mine.

The new 1½-mile flume for the Lucania mine, on the American river above Sportsman's Hall, is completed.

The Colfax Sentinel says that on the 1st inst. the Big Dipper M. Co. closed the working of the Big Dipper gravel mine near Iowa Hill under the company's name. Supt R. A. Watson of the Shady Run quartz mine has the new lower tunnel in 130 feet. The upper tunnel is in 500 feet.

Manager G. T. Crozier of the Haub gravel mine is extending the new main tunnel, now in 130 feet. An upraise will be made to gravel in two weeks.

At Shady Run, T. A. Rodgers is superintendent California M. Co. Drifts and crosscuts are being run to open up a body of gravel. Coarse gold is being taken out, one \$53 nugget being taken out last month. The gold brings over \$19 50 per ounce. The company also own the Independent quartz mine adjoining the gravel mine.

SAN BERNARDINO COUNTY.

The Ludlow mines at a depth of 125 feet have a vein 18 feet in thickness. Three feet is copper glance yielding two ounces silver per ton. The Bagdad mine is a blanket ledge with but a foot or two of soil on top for the first 400 feet, then dips until at 700 feet along the ledge it is 200 feet vertical to the surface. The contract for the grading of the branch railroad from the Santa Fe at Ludlow to the mines has been let to C. H. Hawn.

F. M. Smith has sent twenty prospectors to search Death valley for borax, nitre and other mineral deposits. The men left Borate last week. Smith is locally credited with intention to expend \$200,000 in exploring the valley; there is a strong belief at Daggett that rival interests have got the lead of Smith with a larger party of prospectors. It is the purpose of a portion of the Smith expeditions to find and survey a way for a railroad into Death valley. The borax deposits of Death valley are, according to the belief of Smith, large and valuable and outrank the Mojave desert deposits. It is thought that as soon as they can be properly developed they would be worked by him in preference to his mines at Borate.

SANTA CLARA COUNTY.

The Guadalupe quicksilver mines, near Almaden, are starting up. The old shaft has been reopened again. Cinnabar at a depth of 225 feet is said to assay \$500 to the ton. Oil is used for fuel.

SHASTA COUNTY.

A miners' union has been organized at Keswick.

At the Pioneer Black Oak mine, 5 miles from Delta, the Inca Treasure Co. has twenty men employed and will build a gravity tramway 900 feet long from the mine to the wagon road.

H. C. Woodrow of the Texas mine is shipping two carloads of ore a week. Owing to a scarcity of water at the Garlick electric plant, near Copley, there is a present lack of power.

F. B. Poore is superintending development work at the Sam Houston mine, Old Diggings, adjoining the Texas on the north.

At the Bullychoop mine the new \$35,000 mill is finished. It is connected with the mine by an aerial tramway one-half mile long. It will handle sixty tons of ore every twenty-four hours. Thirty miners are employed.

A stockholders' meeting of the Trinity Copper Co. was held at the office of the Corporation Trust Co., Jersey City, N. J., Oct. 7, to re-elect the present board of directors.

SIERRA COUNTY.

J. Lassat, superintendent Poker Flat G. M. & M. Co., will put in a thirty-ton mill to be run by water power. Fourteen men are constructing a road to the mine.

The New Enterprise M. Co., recently organized, has men at work on one of its properties near Rattlesnake hill, above Downieville.

At Alleghany, the Alleghany Con. M. Co. has a tunnel in 750 feet, to go 250 feet

farther, in hope of opening the Blue Channel.

SISKIYOU COUNTY.

The Con. Cal. Hydraulic M. Co. will develop 500 acres gravel land on French creek, 5 miles from Callahans. J. O. Welch, superintendent, is now operating one plant and preparing to put in eight more. The ditch will be raised to get a fall of 700 feet. It is 10 feet wide at the top, 7 feet at the bottom and $\frac{1}{2}$ feet deep. At the head of the creek are six lakes to be converted into a reservoir, where winter water may be stored that there may be continuous operations.

C. W. Tryer is superintendent of the Tryer group, 4 miles south of Klamath. The lodges trend from the northwest to the southeast and in formation are schist, slate and porphyry, 3 to 23 feet in width, the ore of a rhombohedral quartz with slate intermingled. They give a return mill value of from \$3 to \$50 per ton. There have been three tunnels driven on the property, 600 feet apart, going in 490, 360 and 175 feet; greatest depth from the surface 400 feet at the breast of the lower or 490-foot tunnel. The quartz mill is 1 mile distant from the mine.

SONOMA COUNTY.

Ore from the Culver-Baer quicksilver mine, at Cloverdale, is reported to carry cinnabar in sufficient quantities to justify operation.

TUOLUMNE COUNTY.

(Special Correspondence).—The Star mine on the East Belt has completed renovation of its flume, and will resume operations with the first rains.

The Republican mine at Jacksonville has completed its dam on Woods creek. The water will be raised to the level of the ditch at a point nearer the mill, and loss by evaporation thus lessened. The mill is approaching completion. Sinking continues in the mine, the 500-foot level having been passed. Work will be concentrated in the shaft till the mill resumes operations.

At the Eagle-Shawmut property a protecting ditch is building to catch the surface water, which in the past has found its way into the workings.

Owing to the scarcity of teamsters, the Columbia marble quarry has bought a traction engine to do the work hitherto done by horses.

Sonora, Oct. 6.

The Lady Washington is to be surveyed preparatory to putting in a compressor.

F. H. Harvey has bonded two-thirds of the Garfield mill and will run his ore through the Grizzly mill.—Superintendent Smith has men at work on the Mary Ellen mine.—The New Era hears that the money to reopen the Laura mine has been deposited in Stockton and that operations will begin Nov. 1.—At the Goldwin work has ceased on the 600-foot level. A new pump will be installed and the hoist enlarged.

Superintendent K. C. Parrish of the Spring Gulch has the mine unwatered and sinking and drifting commenced.—The Hardack is all ready to start and is awaiting fuel oil.—Work on the Lost Fox mine is to be resumed. The mill will start Nov. 1.

The Hazel Dell management intends to run a tunnel from the river level 4000 feet to drain the mine and give 900 feet of backs.

At Stent the new millmen at the Juniper mine are F. Drobis and R. L. Aldersley of Grass Valley.

Near Columbia the Vine Spring mine has been bonded to the Yankee Hill M. Co.

The directors of the Von Tromp M. Co., recently incorporated, are W. S. Estey, D. F. Davids, W. O. Chapman, H. Walsh of New York, R. B. Stanford of Columbia.

Near Big Oak Flat Watts & Jefferson have options on the Bicknell, Mohrman, Redjacket, McCarthea and Fair claims.

Near Jupiter the Star M. Co. has completed the flume.—The Stockton Gravel M. Co. have their mill in running order.—The Keltz mine is working steadily. The 10-stamp mill is in constant operation.

The Columbia marble quarry, W. D. Bannister manager, will freight the marble from the quarry to Oakdale with a traction engine and three cars. The traction engine is of 60 H. P., 17 feet 3 inches in height, 11 feet 4 inches wide, 10 feet track, and weighs twenty-three tons. The drivers are 8 feet high and have a face of 24 inches.

Near Stent, at the Shawmut seventy-five men are employed digging a ditch on Blue gulch to take all the water out of the gulch above the mine to prevent flooding of the mine in case of the dam at the head of the pipe line breaking.

TRINITY COUNTY.

B. Glatz, superintendent of construction for the Francis Smith Co. of San Francisco, who had charge of constructing the large pipe line for the Sweepstake Co., now has men at the old pipe shop taking down runways, packing up tools, etc.,

preparatory to shipping them to San Francisco. There will be nearly forty tons of machinery.

COLORADO.

ARAPAHOE COUNTY.

With only one smelter depositing gold bullion at the Denver branch mint, the Boston-Colorado plant in Argo, the total for September foots up \$1,283,626.94, compared with \$1,134,745.92 in September, 1901. The gain, \$148,881.04, is due mainly to the chemical plants, of which the United States Reduction, the Portland, the Telluride and the Economic, all mining on Cripple Creek ores, are regular depositors. Amalgamation mills in the mining districts and placers in Boulder, Gilpin, Clear Creek, Park, Lake and Summit counties also deposit at the mint. The season of 1902, taken as a rule, has shown a gain over last year. The new coinage mint will be completed in about three years.

BOULDER COUNTY.

There is not an idle mine in Sunset district. The amalgamating and concentrating mill at Caribou is completed. The Corona G. M. Co. of Maine has bought Black Cloud, St. Joe and fifteen other claims comprising the Gold Hill group. The Colorado Springs Co. having connected the mine with the Bordeaux tunnel has twenty men timbering preparatory to taking the ore through the 2000-foot tunnel to its mill on Left Hand creek. The Nancy tunnel is in 1240 feet.

C. F. Lake is manager at Cardinal of the Boulder County mine where a great tunnel is opening up rich ore bodies. The mine has been running steadily since June, 1901, and is employing twenty men. The mill has been running since April, 1902, treating about 600 tons a month with satisfactory results. The company will enlarge the mill in the spring.

At Wall street the Nancy tunnel is in 1240 feet, 1230 from the mouth the Gillard vein was encountered and drifted in 550 feet east, in this drift a vertical depth of 530 feet is attained and a depth of 600 feet on the vein. Four hundred and fifty feet from the mouth of the tunnel is the Grey copper vein, drifted in 200 feet west and 225 feet east. In the west drift of the Grey copper there is an ore body 7 feet wide and opened the entire length of the drift.

At Caribou the Alpha tunnel to develop the Sunnyside is in 650 feet.

At Salina the Black Swan mill is in operation and the company has contracted for 30 000 tons of ore for treatment.—The Sunshine Co. are stoping milling ore from a 9-foot vein, to be treated at the Black Swan mill.—The Corona is treating twenty-five tons of milling ore at the Black Swan mill. If satisfactory, a 100-ton mill will be erected on Corona ground.

At Gold Hill the Cold Spring Co. is employing thirty men. Connection has been made with the Bordeaux tunnel. The company's mill on Left Hand creek is running full shift.

CLEAR CREEK COUNTY.

J. C. Saunders, who is described as being "a mine expert from Pittsburgh," is announced at Idaho Springs as having "made many interesting experiments," and "out of every two gallons of water I secured a pint of copper." He finds that "the water is loaded with copper." So is Mr. Saunders' story.

The Carpenters, owners of the Golden smelter, have a bond and lease on the Lawrence Stevens group of mines in the Banner district, two miles from Idaho Springs; the amount represented in the transaction is reported to be \$2,000,000.

Idaho Springs hears that the Seaton M. & M. Co. is operating on Seaton mountain, and will construct a mill of large capacity. The Seaton owns 2800 feet on the vein of the same name.

The Georgetown Courier reports two new strikes in the territory of the Empire Tunnel Co. In the main tunnel an ore vein 1 foot in width, samples showing .48 ounce gold and 14 ounces silver. Since passing the 1300-foot mark a daily average of over 5 feet has been made with two drills. The tunnel is now 1375 feet long. A second strike was made in the drift in the sixth level of the Gold Dirt, which is being run to open the ground east of the shaft and get under the big ore bodies opened on the upper levels—2 feet of smelting ore with a body of milling ore on the side. This ore will run two ounces in gold.

The East Argentine Co. is making progress in the D. and Sidney tunnels. Ores from three places on the company territory recently assayed gave \$14 gold, \$11.65 silver and 6% copper; \$32 gold, \$11.20 silver and 3% copper; and 42% lead, \$8 silver and a trace of gold. The company is prepared for continuous winter work.

Idaho Springs says every section of Clear Creek county shows greater development under way during the month of

September than for the same period one year ago. More air drills are at work and operations are more extensive. With all of this there has been no effort at production and the amount of ore in sight is more than double that of the same period last year. The Chamberlain sampler there, which buys most of the smelting product, handled 2040 tons of first-class ore, averaging \$60 a ton. In addition there were shipments of 350 tons direct to the smelters. In milling ore, all of the mills have been running steadily on the offerings with chances of a heavier tonnage with proper facilities.

H. A. Riedel says the Stanley Con. M. & M. Co. will spend \$50,000 in building a new 100-ton mill.

The Dividend M. Co. of Lincoln, Neb., is finishing a 15-stamp mill on Upper Fall river. An option on the Golden Lily mill of twenty stamps is reported secured by the Robinson Contact C. M. Co. This company is credited with intention to put in new tables and a chlorination plant. R. J. Evans is superintendent.

The Centennial, in Georgetown, is breaking down bonnite ore for another shipment. The ore bodies in the 600-foot level continue to show large values in gold and copper. The mine is steadily improving with development in the deepest workings.

The mills of the district are running to their utmost capacity and have reserves of ore on hand.

At Silver Plume work is being pushed on the Terrible mine. Thirty men are at work on the dam.

The Union tunnel has been retimbered from its mouth to the engine room. The entire mine will be pumped out and the necessary improvements made.

Sixty men are employed by the New Dunderberg Co. The camp has more men working by the day than for fourteen years past.

The main drift on the Seven-Thirty lode, through the Bureleigh tunnel, is making progress by machine drills. Total distance of drift to get under the Seven-Thirty shaft and Bismarck workings will exceed 1300 feet; one-half the distance has been driven up to the present time. When completed it will be necessary to upraise 230 feet, where connections will be made. The completion will unwater 5 miles of old workings and also open up a large area of new and undeveloped territory.

The Mendota shaft is at a depth of 400 feet. Ore bodies have existed between the 300 and 400-foot levels, and drifting under these will proceed.

Twenty men are employed on the Vulcan group, connection having been made between the Daniel Peters tunnel and the main shaft. The Wisconsin continues to be the greatest silver producer in the county.

EL PASO COUNTY.

At Colorado Springs, a Colorado steel casting company has been organized to build a steel plant; \$200 000 will be expended in the project. The plant will be equipped with electric traveling cranes, open-mouthed revolving furnaces and facilities for handling heavy steel beams. The building will be constructed of brick and steel and will cover two acres of ground. It is proposed to begin operation with 100 skilled mechanics, who will be brought here from the East.

FREMONT COUNTY.

At Florence forty negroes from Mason, Mo., have arrived and were at once hustled to the Chandler mine and put to work. The men are said to be inexperienced. The negroes imported from southern Colorado and New Mexico some months ago by the company are deserting daily, claiming they cannot make enough to live on, and that after they pay the extortionate charges for life's necessities at the company's store, where they are compelled to trade, they come out at the end of the month in debt.

GILPIN COUNTY.

During the last week of September shipments of smelting and crude ore, mill tailings and concentrates from the Black Hawk depot to the Golden and Denver smelters and to outside points were eighty-one cars—1620 tons—a total for the month of 361 cars, or 7220 tons.

Snows and rains have delayed the installation of the two hoisting plants at the Pewable and Iron shafts.

Superintendent Woods of the Lyons-Kyle M. Co. will put a fifty-ton lead concentrating plant on the property of the company in Chase gulch, in Quartz Valley mining district, to cost \$15,000.

Black Hawk reports that 81 cars—1620 tons—of ore were shipped during the last week in September over the Southern road, making the total for the month 361 cars, or 7220 tons. Comparing last month's shipments with the same month in 1901, it shows a difference of 61 cars—1503 tons—an increase of more than 25%.

The milling ores from the Ohio prop-

erty, in Vermillion district, treated last week at the Gilpin mill produced almost ten ounces gold per cord. The smelting ore shipped to the Chamberlain sampling works gave \$245.10 per ton for first-class and \$119.38 per ton for second-class. The property is owned and operated by Waldhardt & Kurrl.

GRAND COUNTY.

A copper strike is reported on Strawberry creek in the Harman district, 2½ miles southwest of Arapahoe peak.

HINSDALE COUNTY.

W. C. Wisberg, 503 Olive street, St. Louis, Mo., manager Bon Homme M. & D. Co., White Cross, will build a mill next season.

LAKE COUNTY.

General Manager Schlessenger expects to be able to start the Boston smelter near Leadville in a few months.

OURAY COUNTY.

In the Red Mountain section the Saratoga Pyritic Smelter Co. says it will put in a large smelting plant in the old Saratoga mill at Ironton. The company has secured the old Saratoga mill and mining properties adjoining. Men are retimbering the Saratoga and Albany tunnels, from which they will extract smelting ores. The whole country abounds in low grade smelting ores.

The August returns from Camp Bird show that the mill ran thirty days and crushed 5755 tons dry ore, yielding bullion \$129,200; concentrates (355 tons), \$29,725; total, \$158,925; less expenses, \$54,500; profit for month, \$104,425.

PITKIN COUNTY.

The officers of the Argentum-Juniata M. Co. to-day issue their annual report for the year ending June 30th. In the report President J. A. Hayes says: "As the mine is now closed down, from this time on we will discontinue sending quarterly reports to the stockholders. In submitting this report, I find nothing of encouragement and little of interest to add. The present cessation of pumping in the Mollie Gibson mine and the abandonment of at least the active operations for the company's account have necessitated our drawing the pumps from the lower levels. As these levels will soon be flooded with water, this was done to protect our property, and will only leave the workings above the seventh level uncovered. From the estimates made by our general manager, the concentrating plant and other machinery owned by our company would be worth something like \$100,000 even at forced sale."

During the year ending June 30th the company's mining expenses were \$164,447 97; the mill operating, \$26,045.10; the cost of shipping and selling, \$80,761 56; general expenses, such as salaries, office, etc., \$15,157 61; grand total, \$295,427.63. The mine shipped 10,113.9 tons of ore during the year, the gross value of which was \$323,684.98, leaving a net profit at the mine over operating expenses of \$28,257.15.

General Manager Palmer says in his report: "At 3 A. M. of June 30th steam was shut off the seventh and fourth level pumps and the water was allowed to rise and flow down the siphon in the tenth level raise No. 4, whence it reached the Mollie Gibson thirteenth level pumping station at 10 A. M. of the same date. Inventories were taken of the company's property at the mine and at the thirteenth level station of the Mollie Gibson mine, of date June 1, 1901, showing about \$68,000 in value, exclusive of the joint mill. The superintendent of the company was relieved of his duties as superintendent and appointed resident agent of the company on June 30th."

RIO GRANDE COUNTY.

The Sanger mill at Jasper is started up.

SAN JUAN COUNTY.

Near Silverton, the "Letter G" lode of the Silver Lake group is bought by the Guggenheim Exploration Co. The amount paid for the sixteen claims is about \$500,000. The claims are near Silverton, extending 5 miles along the vein beginning at the Silverton townsite. They are 1500 feet each, and extend for 5 miles along a rich vein. The work of putting the property in shape will be in charge of Superintendent S. I. Hallett. It is estimated that it will take about \$300,000 to complete the improvements and will require about three years. It is planned to construct a tramway for the conveying of the ore to Silverton, which will greatly cheapen the cost of transportation. At present it would cost about \$5 per ton to get the ore to market. With the tramway the cost will be reduced to about 10 cents per ton. With the management now under control of one owner, it will be possible to develop the property as much as it is capable. It is estimated that the total tonnage capacity after the property has been put into good working condition will be from 500 to 1000 tons a day. This

will be then one of the largest producing properties in the State. The claims are all rich in gold, silver, copper and lead, and assays show that the ore runs from \$15 to \$20 per ton.

A 40 H. P. boiler for the Notaway Co. is at the Champion mine. Shipments of ore from Silverton exceed twenty carloads daily. The Esmeralda, in Minnie gulch, is shipping forty tons crude ore per week. The gold and silver product runs \$60. A 10% copper ore is being mined from a 30-inch streak in the Henrietta mine. A contract is let this week for 200 feet of tunnel work on the Sapphire mines in Eureka gulch. Manager Estey has 1000 feet of work completed on the properties. The Eureka Exploration Co., owner Ridgway in Minnie gulch, has begun a tunnel to be 3200 feet long and to cut the Ridgway vein 1000 feet below its present deepest workings. Work on the tunnel will be pushed during the winter by hand, next season power drills will be put in.

The upper Sunnyside mill, near Silverton, is running on ore from the Washington mine. The new 40-stamp mill at this mine is completed and started up and will be kept running all winter.

SAN MIGUEL COUNTY.

The T. E. Thomas property, above the Nellie mine, in Bear Creek basin, south of Telluride, consisting of the Thomas No. 1, Thomas No. 2, Buckley, Portom, Button, Echo, Echo millsite, Duke millsite, together with mill, tramway and other improvements and all water rights, is sold to Alva and F. Adams for \$2000.

Work on the Savage basin road, which is being built from Telluride to the Tomboy mine in Savage basin, is suspended, as the funds voted by the people are exhausted.

C. W. Waterman has been examining the title to the Japan group of mines, located near the Tomboy, in Savage basin. Negotiations have been pending for months past for the sale of this property to Boston men for \$550,000. It is understood that the sale will be consummated and the group transferred at an early date. The mine has been operated for nearly a year under bond and lease.

Twenty stamps in the Silver Bell mine at Ophir are in operation on ore from the Butler Con. M. Co.

The lessees of the upper workings of the Butterfly-Terrible mine at Ophir are employing fifteen men. Fifteen stamps in the mill are at work on Terrible ore. The mill crosscut tunnel is in 1950 feet.

At the Nellie twenty stamps are dropping on ore.

C. Toland has a three years' lease on No. 3 level, Silver Pick mine, all the workings above that level, with the stamp and concentrating mill, and the tram connecting the third level with the mill. All workings below No. 3 the company reserves.

SUMMIT COUNTY.

Georgetown hears that the Pennsylvania group, at the head of Snake river, is sold to M. H. Kern of Bellevue, O., for \$75,000.

TELLER COUNTY.

September production from Golden Cycle amounted to 3800 tons.

Cripple Creek mining men do not seriously regard the suit threatened by the Venture corporation against the Stratton estate. The September production from the mine was, approximately, 8000 tons ore.

The Vindicator output for September amounted to 2000 tons ore.

Victor says the sale of the Hoosier mine, on Tenderfoot hill, to Walsh and associates of Chicago, Ill., has been practically completed; price, \$225,000.

The Victor Record says that before Jan. 1 at least 1000 men will be employed on the Portland mine. The mine has been installing much new machinery of a heavy character of late, opening new ground and preparing for increase in the volume of its output. New and powerful machinery has been ordered for shaft No. 1; the machinery at present in use in this shaft will be taken to shaft No. 3, which they are at present sinking to 1000 feet. Shaft No. 2, where it is believed they will conduct their main workings, is to be sunk to the 2000-foot level and an extensive system of exploration will be pushed. A tunnel is being driven from shaft No. 1 through the Colorado City claim recently acquired by the company; it will be about 1800 feet in length.

Cripple Creek reports a strike made by Lessee Erbel of the C. O. D. mine, located in Poverty gulch, in the sixth level, 150 feet from the shaft, a flat vein of ore 6 feet wide running \$50 to the ton.

Chairman F. W. Baker of the Venture Corporation board is in Colorado. When asked about the \$5,000,000 suit against the Stratton estate he said: "The suit will be regularly brought before the United States Court soon. We were sorry that Stratton died, because there were insinuations made that we were flocking

like a band of vultures to despoil the dead man's estate, and it has put us in a very unjust light, as we have been working for eighteen months on the evidence to be brought up in the case. The fact that he died, while unfortunate to us, will not deter us from beginning proceedings. There are many reasons why we will bring our suit, and we want nothing but our own."

F. S. Oakes of the Buffalo & Cripple Creek G. M. Co. has proposed to the committee on drainage of the Cripple Creek camp to extend the tunnel owned by his company (the Newell tunnel) in a northerly direction under Beacon hill for the drainage of the western part of the camp especially. This tunnel has its portal in Arequa gulch, about 100 feet lower than the portal of the Standard tunnel, hence would, if extended, drain the Elkton shaft to the eighth level. This would allow the extraction of a large body of ore between the seventh and eighth levels. The Newell tunnel is the lowest one in the camp. It penetrates Grouse mountain in an easterly direction. The total length of the tunnel and drift is 1900 feet. The Buffalo & Cripple Creek G. M. Co. offers to continue this drift until the great water saturated area is penetrated in Beacon hill, so as to afford about 100 feet deeper drainage than the Standard tunnel. The offer is made on a basis of "No cure, no pay," but in case drainage is effected thereby, so as to drain at least the western part of the camp, and as soon as it is so demonstrated by the lowering of water in the various shafts, the several mines benefited thereby are asked to pay the B. & C. G. M. Co. the sum of \$5000 per month as long as the mines choose to use this method of drainage, it being understood that it may be discontinued at any time by the mine owners giving thirty days notice to the B. & C. G. M. Co. of such desired discontinuance. Mr. Oakes says that since the "drowning" of the Elkton mine many Eastern investors refuse to make further investment in Cripple Creek camp, unless some quick system of drainage is provided. The plan for temporary drainage was presented to the committee on drainage.

There are 538 men at work on Gold hill. They receive on an average \$3.28 per day.

During September Lessee Wright made a production of about 300 tons of ore from the Thompson of the Elkhorn Con. Co. on Gibbons hill; a new ore body has been opened by the lessee and he expects to ship 1000 tons during October.

The Par Value M. & Leasing Co., operating near Victor, has returns on two cars sent out from the recent strike in the 425-foot level on the Mary Cashen mine, the first one going \$25 a ton and the second \$20 a ton. The ore is coming from the slope above the breast of the workings in the south end of the shoot. The vein runs from 5 to 8 feet wide.

The latest Cripple Creek merger is the Wabash Con. G. M. Co., a consolidation of the Summit, Sunnyside and Zanesville companies.

While the litigation in connection with the Stratton will is in progress the mining properties of the late millionaire are being operated exactly as they were during his lifetime. No one yet has the authority to dictate any policy to the officers of the companies in which Mr. Stratton's Cripple Creek investments were vested. The properties are being managed in line with Mr. Stratton's own policy and will be so managed for the present. All the men are now at work and there will be no change in this respect. W. H. Rice, who was general manager of the Stratton properties and who resigned two months ago, has been reappointed to that position by the executors of the Stratton estate. F. Johnson, who was appointed in Mr. Rice's place as manager, will take the superintendency under Mr. Rice.

The new chlorination mill of the Portland in September handled 7000 tons of ore, average \$30 per ton.

The Isabella in September produced 700 tons ore, mostly the work of lessees. There are eleven sets of them at the various workings.

Twenty-two companies own the acreage of Beacon hill; 12 are in active operation. There are employed on the hill, both on company account and by lessees, operating, 264 men, who receive on an average \$3.26 a day.

The El Paso Company's new equipment is costing \$100,000. The company has 120 men who average \$3.50 per day. Twenty men work on the various leases of the property, making a total of 150 men.

The Elkton Con. M. Co. has cancelled the order for two pumps for the 900-foot level because of delay in delivery.

J. H. Hobbs, of the Findley G. M. Co., says his company will sink its shaft an additional 200 feet to a total depth of 1400 feet. A station has been cut at the 1200-foot point. The company is now in good ore in the eleventh level. When the shaft reaches the 1400-foot point a level will be

cut and a crosscut run out to open up the veins.

September's gold yield in Cripple Creek approximated \$2,000,000.

At Cripple Creek, on Mineral hill, R. A. Trevanthen will manage the Laura Lee and will deepen the shaft to the 300-foot point. There is sufficient ore in sight to pay the cost of sinking the shaft and leave a profit.

The final cleanup at the old Oneida mill, south of Victor, is being pushed. It is expected that 500 tons of tailings will be recovered that will average \$22 to the ton. The work is being done by the S. H. Supply Co., which has purchased the old mill and wrecked it for the machinery. The company has purchased all the old mills of the district and in some cases they have recovered enough values in tailings to more than pay the price they paid for the entire outfit.

At the Zenobia mine on Gold hill the control is held by the Stratton estate—a perpetual injunction granted by the court restraining its absorption by the Stratton Cripple Creek M. & D. Co.

IDAHO.

BLAINE COUNTY.

On the Little Smoky river the Poor Man's Friend, bonded to C. C. Ruthrauff of New York City, shows values in native silver, free gold and iron sulphides. Cornwall & Madden, who own claims on the same ledge, have bonded their property to Pittsburgh men. The Shamrock III, discovered by Mr. Worswick, assays \$24 gold. The White Elephant and Green Timber claims are extensions of the Shamrock III, owned by Reed & Murray. C. C. Ruthrauff has bought a half interest in the Shamrock III and Wilbur claims from Mr. Worswick. They have men running a 300-foot tunnel.

F. E. Ickes, Hailey, is secretary Bell Creek Con. M. Co., which has seven claims that cover 2 miles of ground in the Rosetta mining district. The ore is partly free, principally sulphide. It is the intention to drive a tunnel in the property from the Big Smoky 100 feet that will cut the vein at a depth of 200 feet, and to then put in a first-class air compressor plant, with air drills.

The Hailey Times says there is \$200,000 worth of argentiferous galena ore in the dump of the Tyrannus mines, in the Little Smoky mining district. The ore is to stay on the dump until next spring, when the mill is to be started up and kept running steadily thereafter. It was not started up this year because the water supply was likely to run short.

J. Kirschner will resume work on the Wolfstone group, on Deer creek, and the M. & M. and Hidden Treasure extensions of the Tiptop group of mines, Hailey.

BOISE COUNTY.

Near Idaho City, the Acquisition group of quartz claims in El Dorado gulch is sold to V. Thorne for \$15,000. The group includes six claims.

CUSTER COUNTY.

The Lost Packer group of gold-bearing claims on Loon creek has been bought by J. A. Cizek, J. Barnett, C. A. Molson and T. S. Macbeth. In addition to the Lost Packer group the purchasers also acquire considerable adjoining property, all of which will be actively developed.

The White Knob C. Co. at Mackey has laid off its 150 employees pending completion of tunnel to drain the mine, affording economical outlet for the ore, with which connection may be made within eight months, about 1000 feet beyond the present station. Ten men with machine drills are at work thereon. G. Hamilton is superintendent. The ore bodies are large, running in copper, gold and silver.

Three miles from Marble City is the Dewey mine, the discovery of which caused so much attention to be directed to the Thunder mountain district. A recent returned prospector says: "The work at the mine is done in great secrecy. No one is admitted to the mill, and when we went in we were practically ordered to get out. However, it was not before I saw that they have only five stamps in operation. It is said that the company has 100 more stamps at Boise City, but they will not be brought to the present mill of the Dewey mine. It is probable that they will be put up, if they ever are, at Roosevelt, a small place three miles from the mine, and opposite to where Marble City is located. The ore is hauled from the mine to the mill in covered wagons so that no one may see the kind of ore being treated. There is much stuff on the dump and very little is going through the stamps. The company is thinking of putting in concentrators in addition to their stamps."

SHOSHONE COUNTY.

The Empire State-Idaho M. Co., Burke, Idaho, has started the construction of a machine and blacksmith shop near the Hecla shaft house. The framework is partly erected and the building will be

completed in a week or two. The company is also arranging to erect larger and more extensive ore bins. The old bins are no longer sufficient to hold the ore with the increased output. The lumber for the building is on the ground and construction will start in a few days. The company is shipping from four to six cars of ore per day to the mill.

The New Jersey G. M. Co. has bought the Coleman gold property, on Big creek, 6 miles from Wardner.

Delta reports a fourth dredge company to operate the placer grounds of Beaver creek—the Mascot G. M. Co. Construction of three dredgers for the other companies has been started.

The Bunker Hill & Sullivan M. & C. Co. paid a dividend of \$9000 on the 6th inst.

In the litigation of the Yolande M. Co. vs. the Gold Hunter M. Co. et al., previously referred to, the court has denied the motion to remand, and held that no injunction was now in force. It is ordered that the Gold Hunter M. Co. make a full report of the condition of the property in controversy, showing the ore extracted and the expense thereof from date of contract.

J. A. Finch, referring to the agreement recently entered into by Cœur d'Alene mine owners and smelting trust, says: "The agreement assures the mines of this district running to their full capacity in future—12,000 tons per month exclusive of the output of the Bunker Hill, amounting to about 3000 tons a month. The agreement made assures that all mines of the district will be run to their full capacity limit, for 15,000 tons per month, mostly concentrates, will be all that the mills can turn out—more than the monthly average of clean ore and concentrate shipments of 1900, which reached 14,280 per month or 171,412 tons for that year as against a slightly restricted output of 148,890 tons for 1901, or a monthly average of 12,407 tons for the latter year. The aggregate output for 1900 and 1901 was 320,302 tons as against 212,649 tons for the years 1898-99, showing an increase of 107,653 tons, or an average annual increase in excess of 50,000 tons. A production of 15,000 tons per month will be considerably greater than the average for the six months of 1901—from January 1 to July—which was 14,298 a month. It is assumed that if the district is to meet the 15,000 tons per month limit the Frisco mine and mill will have to resume operations, for the combined output of the Silver King and Hercules, the new producing mines, cannot equal the Frisco's old-time product of 2000 tons per month.

The Northwestern sampling and millage plant, a mile west of Wallace, has been sold by the mine owners' association to the American S. & R. Co.

MICHIGAN.

HOUGHTON COUNTY.

At Houghton, in boring up to pierce the roof of the intake tunnel of the Champion mill, the discovery was made of an extensive false bottom under Lake Superior, composed of a saturated stratum of gravel 7 feet thick underlying a thin stratum of hardpan forming the lake bottom. This leaves 12 feet of solid rock over the end of the tunnel, instead of 18 feet, and may explain the trouble with other tunnels from infiltration of sand.

The new cupola smelters at the Dollar Bay plant are a great success, handling 200 tons of slag from the reverberatory furnaces in twenty-four hours. At present it is necessary to run the plant only twelve days each month, as compared with twenty-five days under the old system.

The new plant for the recovery of copper from Calumet & Hecla sands is completed. The plant will have a capacity of 120 tons daily. The process, it is claimed, will save flour copper—something heretofore impracticable.

MONTANA.

DEER LODGE COUNTY.

The Standard says: All of the large hill mines of the Anaconda Co. are to be drained of their water through the shaft of the High Ore, which has reached a depth of nearly 2300 feet. These mines include the Anaconda, St. Lawrence, Never Sweat, High Ore, Green Mountain, Diamond, Bell, Modoc and Wake-Up-Jim. The High Ore has three large pumps on the 1000, two on the 1600 and two at the 2200. It has an 80 or 90-foot sump for the reception of the water from the other properties, and as soon as all of the connections are made, which will be in a short time, all pumping will be suspended at all of the mines save the High Ore. In order to make the drainage perfect the bottom of the latter shaft will be kept below that of the others. The High Ore has very little water of its own, but there is some running into the workings from adjacent mines. At present a crosscut is being driven from the 2200 of the High Ore to connect with the lower workings of the

St. Lawrence, Anaconda and Never Sweat. As soon as it is complete the water of these three mines will flow into the sump of the High Ore and thence forced to the 300 by the large pumps in use there. On the east side of the hill, at a point near the Leonard mine, a tunnel has been driven into the hill and connected with the shaft of the High Ore at a depth of 300 feet from the surface. This is what is known as a water tunnel, it having been designed for the purpose of carrying away the volume from the pumps of the mine. Before the tunnel was driven all of the water was raised to the surface. As a result of the change the copper precipitating plant, which was formerly located near the High Ore, is farther down the hill and is in charge of P. H. Regan. After the connection with the St. Lawrence and other large mines is made the water now flowing into the copper precipitating plant below the St. Lawrence will cease and the plant will be abandoned.

The mines at Danielsville have resumed. Travel between Danielsville and Anaconda is large.

A. Hinze of the Gladstone G. M. Co. is building a mill for his company near Pioneer.

FERGUS COUNTY.

C. A. Carse, at Lewistown, has formed a mining company to explore and work properties in the Judith and Moccasin mountains. He will let a contract for five exploration tunnels from 200 to 300 feet in length.

The Great Northern M. Co. has turned over its Gilt Edge mine to a syndicate headed by J. A. Drake. The mine has paid large dividends. Two installments on the payment of \$50,000 each have been made in the last three months. The amount of the final payment is locally set at half a million dollars. J. A. Drake will make many improvements, both in the general plant and in the mill, the capacity of which will be doubled. Ore from the property runs from \$6 to \$12 a ton and has been worked in the past in a mill with a capacity of 140 tons a day. This will be increased to 300 tons a day. Several fractional claims adjoining the Gilt Edge have been bought by the new company under the name of the Gold Reef M. Co. Roasters will be installed to treat the refractory ore, a 10-drill compressor put in and other apparatus added. J. H. McCormick will be superintendent. Mr. Mackenzie, general manager and consulting engineer of the company, is a member of the firm of Dickman, Mackenzie & Potter, Chicago.

FLATHEAD COUNTY.

F. Cummings of the Friday group at Sylvanite has 18 inches of ore showing free gold.

GALLATIN COUNTY.

F. W. C. Whyte, in charge of the new coal mines, says seventy men are employed by the company at the plant at Storrs; about 100 ovens will be in operation by January 1. It has not been decided whether to go into the manufacture of coke with the idea of saving the by-products or not.

GRANITE COUNTY.

It is expected that the mill of the Denver and Montana Reduction Co. at Garnet will be restarted again next month.

Murray & Miller have leased the Lead King mine at Garnet from P. Mussigbrod. They have shipped a carload of ore which they thought would average between \$60 and \$70 in gold per ton, but it went \$154. The mine is developed to a depth of 500 feet.

LEWIS AND CLARKE COUNTY.

The output for August of the Montana M. Co. was 1600 ounces gold and 10,800 ounces silver, obtained from 2050 tons of ore crushed and 13,468 tons of tailings treated. The tailings yielded \$28,000, and the cost of treatment was \$15,500. The total estimated income was \$37,100, the expenses \$27,100, leaving a profit of \$10,000.

MADISON COUNTY.

At the Revenue mine, 13 miles east of Pony, fifty miners are working on the lower levels of the mine. Four tons of gold rock per month is the present output. The ore averages \$100 per ton.

At Rochester there are 113 men on the payroll of the Watseca and seventeen on each shift at the Elgin, near the Watseca. The Watseca owners are building a mill in which to crush the average grade ore. The company has one mill in operation. It is doing good work but its capacity is not sufficient. Considerable of the high-grade ore is shipped to Helena for treatment, the quantity aggregating about twenty tons per month. When the new mill is started it is possible that the entire product of the mine will be treated on the ground.

The Kearsarge property near Virginia City is yielding ore and is being developed systematically. A contract for sinking the shaft an additional 100 feet is let at a cost of \$8 a foot. The Kearsarge is under

lease and bond to W. B. Millard. Considerable of the ore of the property carries free gold.

MISSOULA COUNTY.

J. Day at Salteso started work on the Bryan property, which he recently bonded.

PARK COUNTY.

Anthracite coal is reported found near the mining camp of Contract.

The Unicorn group, Boulder district, has been sold to Colorado men for \$12,000. They will erect a plant when the property is thoroughly developed.

NEVADA.

ELKO COUNTY.

C. M. Spence is operating a new smelter at his Black Forest mine, Spruce Mountain district, southeast of Wells. The plant is closed down temporarily because of scarcity of water. While in operation it turned out 250 bars per week. The product is hauled from the mine to Wells or shipment.

ESMERALDA COUNTY.

Hawthorne reports that after a trial of two weeks the suit of the Southern Nevada M. Co. against the Holmes M. Co. is decided in favor of the plaintiff. The jury's verdict gave the Southern Nevada Co. possession of the mine and \$43,000 damages.

Tokop mining district is in Esmeralda county, 60 miles south of Tonopah. Assessment work is being done on a number of claims. Ledges from 18 to 24 inches in width, carrying as high as \$30 to the ton, have been discovered. The lack of water, which has to be hauled 9 miles, is the greatest drawback to development.

HUMBOLDT COUNTY.

W. G. Adamson has bought the Winnemucca mine, 5 miles west of Winnemucca.

LINCOLN COUNTY.

The Bamberger mines at DeLamar will have a 2000 H. P. plant. Power will be transmitted 14 miles. The new mill by January 1 should be treating 500 tons daily.

Ore from the E. & F. M. Co. at Pioche on controls shows 31.4% copper, 13 ounces silver, 40 cents gold per ton.

J. A. Denton says that the Clark railway people will have a thousand men at work in the county by the middle of November. In that section of the State construction work progresses more rapidly and easily in winter than in summer because of the climatic conditions and the better supply of water.

The Nevada Keystone Co., Sandy district, is working twenty men at the mine in rich ore. The company wants to buy the surrounding claims. The cyanide plant at Sandy is reported to be a success.

F. O. Wilkinson, who represents the Hearst estate on the Sandy, has at Manvel 13,000 pounds of machinery for the Green Monster claim.

J. D. Loop, near Good Springs, has samples of cinnabar ore running 2% and \$10 per ton in gold.

The stockholders of the April Fool M. Co., whose mines and mill at DeLamar were absorbed by the Bamberger DeLamar Mines Co., have been paid a dividend of \$200,000, or 40 cents a share, as proceeds of the sale.

LYON COUNTY.

The mill for the North Rapidan Co. at Como is in Dayton from Grass Valley, Cal. At Rockland the new 5-stamp mill erected by the Nevada Chief M. Co. is reported doing good work. Ore is being sacked from the 20-inch streak in tunnel No. 1 and averages \$100 per ton.

The Nevada Reduction Works is operating its cyanide plant at Dayton, capacity sixty-five tons daily, also the Heather cyanide plant in Six Mile canyon, fifty tons daily. The Reduction Works is also operating the Luzerne mine, above Silver City. The Rock Point mill has been idle on account of low water in the Carson river, but the stream is rising and the mill will soon be dropping its twenty stamps.

NYE COUNTY.

A U. S. geological survey of Tonopah, Nev., has been ordered by the department at Washington; it will begin November 1 under the direction of J. E. Spurr, who has just returned from Persia, where he has completed a survey for the government of that country. He will be assisted by W. J. Peters, who is now completing the survey in the Treadwell country, Douglas Island, Alaska.

The Tonopah & California G. M. Co., W. B. Sollender, manager, will work its nine claims east of the town of Tonopah.

At Tonopah the Fraction Co.'s triple-compartment shaft has a lead of ore at about 360 feet depth, about 900 feet from where they struck the ore in the first shaft.—The Tonopah Co. has a new lead 10 feet wide of rich ore in an upraise. They ran through 150 feet of poor ground on the 300-foot level and struck a lead of

ore in the southeast corner of the Mizpab claim, running due east.

The Pactolus Co.'s main ledge, the Twilight, has been uncovered for 500 feet in length, averaging from 3 to 7 feet. Assays from this ledge have run \$150 in gold and silver. The ore is free and readily pans. The formation is rhyolite porphyry, similar to the formation in Tonopah. The ore shows born silver and in places free gold. The property is at present tied up under option.

ORMSBY COUNTY.

J. P. Woodbury is overhauling and rebuilding portions of the Morgan mill, on the Carson river, near Empire. A cyanide plant will be in operation, a quantity of tallings being ready for the run. A 30 H. P. electric motor will be put in and power furnished by the Truckee River General Electric Co.

STOREY COUNTY.

The Potosi mine, regarding drill hole No. 2 on the Brunswick lode, which was abandoned after reaching a depth of 950 feet, says the hole passed through a width of 60 feet of vein material, consisting chiefly of quartz and spar, yielding assays of from \$2 to \$5 per ton. Grading preparatory to starting hole No. 3, at a point about 350 feet south, or on about the south line of the Potosi ground, is now under way. Contracts have been let for installing electric power at this point and the drill will be run by that power hereafter.

On the 1600 level of the Union shaft the joint Sierra Nevada and Union Con. east drift from the station has been advanced 14 feet in porphyry. The south lateral drift from the main west crosscut 294 feet in from the station is in 34 feet, with the face in vein porphyry. The south drift from the west drift, 390 feet in, is now 610 feet south of the north line of the Union Con. mine, with the face in soft porphyry and clay.

The Ophir M. Co. has received two bars of bullion of the gross assay value of about \$3800, being the returns from 191 tons of second-grade ore worked at the Douglass mill.

WASHOE COUNTY.

Near Reno A. E. Murdock of the Last Chance mine has arranged to continue work all winter.

The payroll at the Wedekind mine, north of Reno, averages \$4500 per month. There are sixty men employed on the Sparks property.

NEW MEXICO.

COLFAX COUNTY.

T. B. Harlan of St. Louis and J. Leahy of Raton have incorporated the New Mexico & Pacific Railway Co., to build line from Raton to Elizabethtown, 80 miles, the line ultimately to be extended to the Pacific Coast, following the thirty-seventh parallel. Chief engineer, O. H. B. Turner.

DONNA ANNA COUNTY.

The Modoc M. Co., 14 miles from Las Cruces, in the Organ mountains, is operating the Hooper pneumatic dry concentration process. The ore averages 20% lead and from three to ten ounces silver per ton.

GRANT COUNTY.

B. L. Berkey will treat the sulphides of the Orion Co., near Lordsburg. He has leased the concentrator belonging to the Lena M. & C. Co. and will add a leaching plant. He will put in one fifty-ton tank. The water level and permanent sulphides in most of the mines in the district are at a depth of from 200 to 400 feet.

LINCOLN COUNTY.

Near White Oaks the purchase of the Old Abe mine with the coal and all the property belonging to that company by the Eagle M. Co. has resulted in an increasing activity. The South Homestake mine has also been acquired.

Rich pockets are opened in the American mine at Nogal, one of the Eagle Co.'s group. One pocket produced \$5000 in wire gold and a large nugget was taken out of the other. Ore is being taken from a vein 3 feet wide in that mine which runs \$400 per ton. The company is running the Old Abe mine twenty-four hours a day.

OREGON.

BAKER COUNTY.

Sumpter says the North Pole mill is to be increased from ten to forty stamps. The frame of the Psyche 20-stamp building is finished. A new hoisting engine will be put in by the Virginia Co. in Greenhorn district. A wagon road is being built from Geiser to the Tempest mine. The main shaft of the Bonanza mine is down 800 feet.

Baker City reports the sale of the Baisley-Elkhorn mine to the Beaver M. Co. F. P. Hayes, formerly president and manager of the Bonanza mine, is back of the deal. The consideration named in the

deed is \$40,000 and the purchaser assumes all indebtedness and liens against the Baisley-Elkhorn. In addition to this purchase Mr. Hayes owns sixty-three adjoining claims. The work of opening up the property will begin at once. A tunnel 1 1/2 mile long is to be run, crosscutting all the claims. The contemplated improvements will cost \$250,000.

Near Geenborn, a new mining town, 26 miles from Whitney, at the Psyche mine, forty-eight men are employed. A new 20-stamp mill will be in running order Dec. 1. The Snow Creek has eighteen men running a tunnel and sinking a shaft.

Marshall Bros. are working sixteen men and running their ore through an arrastra. The Morning group is being worked by eight men. On the Belcher fourteen men are at work. The Olive Creek M. Co. has men crosscutting to the ledge. The I. X. L. has sixteen men at work. The ore averages \$15 to the ton. Next spring they will put up a mill.

Manager Parker of the Phoenix has twelve men at work and projects a 10-stamp mill next season. The Don Juan has sixteen men sinking. They expect to go down 200 feet. Manager Kennerly is putting up new machinery on the Gold Coin, including an air compressor, and will drive a 2000-foot tunnel. Eighteen men are at work in the Virginia. The mill building is under way.

The Gallagher group of nine mining claims, near Lookout mountain, are sold to May & Williams of Kansas City for \$40,000, 10% paid down.

Sumpter says the Dixie-Butte Mining & Mines Co. will build a mill plant to cost \$30,000—capacity fifty tons daily.

JACKSON COUNTY.

The High Line ditch, which has its terminus 440 feet above the depot at Gold Hill, is assured. The Ray enterprises have 130 men on the payroll. In the building of the Ray dam men discovered nuggets of various sizes. The gravel panned \$2. Rogue river was once known as Gold river.

The Bowden group of mines are sold to the Yellow Jacket M. & M. Co. F. Jordan is superintendent. The first payments of \$30,000 have already been completed and the final payment of \$10,000 takes place to-day. The property consists of four claims and the vein averages 3 feet. It has been developed to a depth of 150 feet. The company have a 5-stamp quartz mill. Twenty men are employed and \$500.00 will be spent in boiler, hoists and air compressors.

SOUTH DAKOTA.

LAWRENCE COUNTY.

At Deadwood an injunction has been issued restraining the Terry Peak Miners' Union from further interference with H. Collings, the foreman who was driven out of Terry. Collings has brought suit against the union for \$5000.

PENNINGTON COUNTY.

The Horseshoe M. Co. blows in their new smelter at Rapid City this week. It was built by the National Smelting Co. of Boston, being completed and started last spring; it ran for some time, but closed down for lack of ore. It was then bought by the Horseshoe M. Co.

At the Elkhorn yards, Deadwood, the ore is dumped from the narrow gauge cars to the wide gauge ones to be shipped to the smelter. The narrow cars which bring the ore from the mines are run upon a trestle, under which is built a standard track. The ore is allowed to go through the bottom of the cars, down chutes, into the standard gauge ore cars, which are then sent to the smelter.

UTAH.

BEAVER COUNTY.

Geo. E. Lane of the Success M. Co. will do development work on the promising property west of the Copper Mountain. The group consists of five claims which are traversed by four veins, croppings from which carry 7% copper. It is proposed to sink a shaft 450 feet at the intersection of these veins.

GRAND COUNTY.

Superintendent McBride of the La Sal M. & M. Co., at Cashin, on the east slope of the La Sal mountains on La Sal creek, about 30 miles southeast of Moab, says he will put in a large smelter, to be built at the mine, to handle ores from the La Sals, Big Indian and Lisbon Valley properties.

IRON COUNTY.

W. E. Ladd and R. E. Fosdill, representing the Colorado Fuel & Iron Co., are at Iron City, where, it is represented, they are securing iron deposits.

JUAB COUNTY.

Manager Josephs of the La Reine M. Co. has closed the mine down and levied an assessment of 1 cent per share to pay the indebtedness of the company.

P. L. Williams, to whom was referred

the \$1,000,000 claim of the Bullion-Beck M. Co. against the Eureka Hill for unlawful extraction of ore from the former's territory at Tintic, has found for the plaintiff and fixed the damages at \$105,953.

The Tribune says the contract system adopted by Manager C. E. Allen at the Centennial-Eureka is satisfactory. At present the payroll has 120 men thereon.

SALT LAKE COUNTY.

The Bingham Bulletin reports from the Ben Butler two more carloads of ore from its September shipments, making 400 tons of crude ore and concentrates. Twenty-eight men are employed. Indications are that October will beat the Butler's shipment record.

At the Nast, New England C. & G. M. Co., Superintendent Hazelgrove has at face of No. 5 raise from Nast tunnel 3 feet of lead ore.

The Mascot (Dalton & Lark) tunnel and air shaft are now connected; length of completed tunnel, about 4300 feet; remaining distance to Brooklyn vein—between 1600 and 1800 feet—will be driven.

A decree of foreclosure—judgment \$12,000—has been granted J. Nelson against the Copper Glance M. & M. Co. and Illinois M. Co., owning groups of claims between the Conger and Fortune mines.

SEVIER COUNTY.

The Salt Lake Tribune says P. A. H. Franklin will found a new camp south of the Annie Laurie, on Gold mountain. In prospecting Cottonwood gulch, overlooked by Mount Delano, he found the ledges numerous, with quartz identical with the gold-bearing quartz gold in Gold mountain, and bought or secured by option nearly 800 acres 4 miles south of Gold mountain.

WASHINGTON COUNTY.

The Silver Reef M. & R. Co., incorporated to work the tailings of the Barbee & Walker, Christy and Leeds dumps at Silver Reef, has machinery in operation.

At St. George the Utah & Eastern Co. has laid off most of the men at the mine and put them to work on the canal and road leading to the new smelter, and will rush the building of the new plant so that the Dixie may be a producer.

WASHINGTON.

FERRY COUNTY.

A rate of \$2.50 per ton has been made by the Kettle Valley lines for trial shipments of ore from the Republic mines to the smelters at Trail and Nelson, B. C. This rate, it is thought, will enable the Republic mines to extend the market for their siliceous ores.

OKANOGAN COUNTY.

McKeown & Wilson at Conconully have a 500-foot contract in the tunnel of the Mineral Hill M. Co. The tunnel is now in 563 feet, the additional 500 feet will give a vertical depth of 550 feet.

WYOMING.

CARBON COUNTY.

At Encampment the Rambler M. & S. Co. has incorporated and succeeds the Rambler C. Co. in the ownership and operation of the New Rambler mine, purchased for \$350,000. The new company has the mine, the newly installed smelter, the sawmill and two adjoining properties, the Isabella and the Strangler. By the purchase of these additional properties, the new company has 6000 feet on the vein in which the Rambler strike is located. The officers of the company are: President, F. B. Wootton, Madison, Wis.; vice-president, A. T. Holmes, Laramie; secretary, M. M. Green, Chicago, Ill.; treasurer, C. A. Jones, Laramie. The company will install air compressor drills and other machinery to do extensive mining.

FOREIGN.

AUSTRALIA.

Reports from the mines department of New South Wales show the export of silver and silver lead in matte, bullion and ores for the first six months of the current year was valued at £708,747, against £1,071,192 for the corresponding period of 1901, the decrease being £362,445, or about 33%.

BRITISH COLUMBIA.

B. R. Atkins, customs officer of Revelstoke, collected about \$2000 duty on the stamp mill for the Northwestern Dev. Co.'s Cambarne group.

Fairview reports that the property of the New Fairview Corporation, Ltd., has been sold in England for \$800,000, \$50,000 down, \$350,000 in three months, and the balance later. The company's chief mining property is the Stenwinder. Levels opened at 100, 200 and 300-feet respectively have developed a body of quartz ore.

M. F. Donahoe is manager O. K. and I. X. L. mines, near Rossland. The mines are in the hands of the Old National Bank in Spokane. Development work will soon be resumed. He says they are the only

free milling ore mines in that district and have the only 10-stamp mill there.

At Rossland, Gooderham-Blackstock interests, controlling the War Eagle and Center Star mines, have incorporated the Rossland Power Co., to construct and operate a concentrating plant on the principle now being tested on a commercial basis at the Silica Reduction Works by the same interests. Construction will not be started until next spring.

The Pacific Improvement Co. of San Francisco has sold to J. Dunsmuir its British Columbia coal properties. A. D. Shepherd, manager Pacific Improvement Co., says that negotiations for the transfer will soon be concluded. This company had not been anxious to sell out, he said, but a good offer had been made for its property in British Columbia and this offer had been accepted. The Pacific Improvement Co. is subsidiary to the Southern Pacific Co.

The Eva F. M. G. M. property on Fish river, near Goldfields, in the Kootenay, has been sold for \$300,000 to the Calumet and British Columbia mines, limited. The purchasers are English and Chicago men.

The Greenwood municipal council has decided to build a tramway to Phoenix.

From Rossland the Le Roi is now shipping \$50 ore to the Northport smelter.

LOWER CALIFORNIA.

The Peninsula M. & S. Co., incorporated in Los Angeles, is locally believed to be a subordinate corporation to the Amalgamated Copper Co. of New York, which is said to now possess, in the name of the Peninsula M. & S. Co., nearly all copper mines within 16 miles of the ocean in Lower California.

MEXICO.

Parral is now considered the largest producing mining camp in the republic, due particularly to the great quantity of high siliceous ores existing there. The Parral ores run about thirty ounces silver to the ton. The great excess of silica which the Parral ores carry would make them worthless were it not for the demand for them to flux the ores of the sections where the smelters are so short of that flux that they buy the ores of Parral and pay a premium therefor.

The annual report of the Mexican Central Railway for the year ending Dec. 31 shows that the company in handling its traffic received the Mexican silver dollar at 100 cents and paid some of its local expenses at the same rate. In remitting the balance of the earnings, the company received between 50.89 cents and 44 cents for Mexican dollars, giving an average for the year of 47.83 cents, as against 45.92 cents, the average in 1900. As late as 1896 the company received 53.17 cents, and in 1891 an average of 76.74 cents, U. S. currency, in exchange. The loss on the total revenue, which in 1901 reached \$17,125,340, Mexican currency, when changed into gold currency at 47.83 cents, is burdensome.

CHIHUAHUA.

The Las Vegas copper mines, near Coyame on the Rio Concho, are sold to Eastern men for \$85,000 gold. The Las Vegas mines have been worked for years and \$50,000 worth of ore has been shipped, and there are at present 3000 tons of ore on the dump. The owners had never been able to work the mines on an extensive scale owing to distance from the railroad and lack of capital, the wagon freight from the mines to Chihuahua being \$20 per ton, besides \$11 gold per ton for freight from Chihuahua to Aguascalientes and treating the ore. It is the intention of the new company to install modern machinery, and with the completion of the Orient road, which will pass within a distance of 6 miles of the mines, the property will become a large producer.

G. W. Boyce is manager Boston & Chihuahua Co., which will develop prospects in Terrazas.

The strike recently made by F. McDonald has added new interest. At the depth of 250 feet ore was struck, having a face 30 by 50 feet. The ore carries 45% lead and considerable silver.

A. F. Nathan, general manager Canrose syndicate of London, is in Minaca from Sierra Boluda. The Sierra Boluda gold mines will be developed by his company.

SONORA.

L. Ephraim, of Nogales, is manager of the Promontorio property, Magdalena district, 28 miles from Nogales. He will sink a 500-foot vertical double compartment shaft and will put in a new hoist capable of sinking 1000 feet.

The Rio Yaqui International Transportation and Metallurgical Co. has been formed by C. S. Thomas, L. M. Goddard, W. Faulkner, together with other Eastern and Western men. The company has possession of 18 mines in the Rio Yaqui valley, 125 miles from the Gulf of California, 175 miles southeast of Hermosillo. The mines are nearly 200 miles from a railroad and only the richest of the ore has been

shipped out. The plans of the new company include the building of a smelter at the mines or some nearby point. The company has also acquired coking coal land near Nogales, which the company will develop for its own use. From present prospects work on the properties and general operations of the company will be under way by Jan. 1, 1903. J. D. Blake is secretary-treasurer and V. Lucier, of Florence, Colo., will be in charge.

Three feet of \$40 free milling gold ore is reported by J. R. Mosley, 10 miles from Moctezuma, Sonora.

NEW SOUTH WALES.

Mr. E. J. Laughton, managing director the Block 14 mine, Broken Hill, says the property is to be closed down at once pending the reconstruction of the company. For four weeks of August the outlook from the Broken Hill Proprietary was 374,791 ounces silver, 4452 tons of lead, and 41 tons antimonial lead, as compared with 372,766 ounces silver, 44 tons lead, and 39 tons antimonial lead for the previous period in 1901.

The gold yield of Victoria for August was 85,687 ounces, compared with 76,205 ounces for August, 1901. The total gold production of the State for the eight months of the present year is 551,051 ounces, against 501,919 for the corresponding term in 1901.

SOUTH AFRICA.

The gold output of the Transvaal mines for August, 1902, is cabled at 162,750 ounces, an increase of 134,276 ounces over the corresponding month last year. From Jan. 1 to Aug. 31, 1902, the output has amounted to 968,771 ounces, against 81,600 ounces for the same period in 1901, 251,801 ounces for the corresponding months in 1900 and 3,502,048 ounces for a similar time in 1899. In the first eight months of 1898 the output was 2,697,917 ounces; in the corresponding months of 1897 it was 1,890,513 ounces.

TASMANIA.

At the Tasmania mine, Beaconsfield, Tasmania, 105 stamps are now installed and the plant is in a position to crush 1200 tons per week. The cost of milling during the half year was 4s 2½d per ton, concentrating is 2.99d per ton, and of chlorinating 3s 4.77d per ton; the total cost of the ore treated at the reduction works being 8s 10d per ton, out of total costs amounting to £1 14s 1½d per ton. The average of the ore treated during the half year was 16 dwts. 2.16 grs. per ton. That ore so far has only been broken down to the 818-foot level. The company has reached the reef in a crosscut at the 1000-foot level, and is now crosscutting at the 1100-foot level, above which point the manager estimates there are 300,000 tons of ore to be mined.

THE KLONDIKE.

A strike is reported on Duncan creek and there is a rush from Dawson. Three hundred dollars a day is said to be taken from one quartz claim. The scene of the strike is 60 miles from Dawson, in the Rockies.

Books Received.

Among the books received this week the most noticeable and the most deserving is Vol. X of "The Mineral Industry," for 1901. Considerable has appeared herein concerning the previous volumes, mostly commendatory, and there is in this present volume more to commend and less to condemn than is usual in a work of this kind. In noting any defect in such a volume the critic who has himself tried compilation of statistics is withheld from adverse remark by the realization of how difficult it is to secure uniform accuracy, and when he notes omissions, he is further aware of the mass of material that must be edited. Hence, the standard of criticism should be a lenient one, for the whole idea is deserving of praise, as it is an ambitious attempt to annually compile what is best in mining and metallurgical progress, and this advances the art. The writer believes the chapter, "Review of the Literature on Ore Dressing in 1901," to be the most valuable of the many valuable chapters in the book. The article on "Progress in the Electrolytic Refining of Copper in 1901," is deserving of special notice. The article "Progress in Gold Milling During 1901" deserved better treatment than it received, the article on gold dredging being a little weak. "Recent Improvements in Lead Smelting" is a notable article. The "Notes on Platinum and Its Associated Metals" seems to have been somewhat carelessly prepared. The new and growing subjects of electro-chemistry and electro-metallurgy receive fine treatment in a 23-page article that shows clever understanding of these subjects, and the progress of metallurgy—a matter of kindred interest and importance—has deserved place in pages

699-710. The miner, metallurgist, chemist or electrician will find much of interest in the volume, which deserves a place on the library shelf with its predecessors. It is edited by Dr. Jos. Struthers, and is published by the New York Engineering and Mining Journal, Incorporated. Price \$5.

Catalogues Received.

What is in many respects a model catalogue is received from the Pelton Water Wheel Co. of San Francisco and New York. It is of standard size—6x9 inches—convenient for shelf or binding, has a cover that is neither flimsy paper nor with the stiffness of rigid boards, but flexible and durable. Typographically, it is a gem, the halftone engravings from wash drawings being fully equal to the finest magazine work, and the paper, printing, embossed cover, making it such a book as one would like to have—all this, apart from its technical contents, profusely illustrated description of the Pelton water wheels and appurtenances, accounts of prominent installations, discussion of electric transmission, lists of concerns throughout the world using the Pelton wheel and the usual tables. The treatise will be sent on application to the Pelton Water Wheel Co., 125 Main street, San Francisco, Cal., or 143 Liberty street, New York City, N. Y.

The American Engineering Works of Chicago, Ill., sends its usual little bunch of booklets, this latest series relating to ore cars and prices current on a variety of mining supplies. These pamphlets are of convenience to intending purchasers, and will be sent to any address on request.

Personal.

JAS. F. WARDNER is in Rossland, B. C.

T. A. RICKARD has gone from Denver to New York City.

A. H. JOCELYN, of Denver, Colo., is visiting San Francisco.

GEORGE M. MIX is manager Oro Hondo M. Co., Deadwood, S. D.

S. I. HALLETT has returned from Aspen to Silverton, Colo.

J. W. MORGAN is foreman of Golden Gem mine, Cerbat, Arizona.

C. L. HANSON is manager California-Tonopah Co., Tonopah, Nev.

D. A. FREEMAN has returned from a California trip to Salida, Colo.

G. K. MCCORNICK has returned to Salt Lake City, Utah, from Europe.

GEORGE CROFT is superintendent Hudson mine, Red Mountain, Colo.

T. A. LISTER, president North American M. Co., is at Lordsburg, New Mexico.

R. S. BILLINGS is manager Rocky Mountain Smelting Co., Florence, Colo.

R. H. POSTLETHWAITE, of San Francisco, who has been seriously ill, is convalescent.

CURTIS H. LINDLEY has returned from the Cœur d'Alene mines, Idaho, to San Francisco.

M. K. GALUSHA, of Spokane, Wash., says he will start up the Jumbo mine, Rossland, B. C.

H. W. PAULSEN has resigned as superintendent Standard S. & R. Co., Val Verde, Arizona.

C. T. MIXER will have charge under the new company of the Creole property, Park City, Utah.

A. L. DICKERMAN, manager zinc plant, Park City, Utah, has returned there from Canyon City, Colo.

JNO. R. WILLIAMS has been re-elected president Chemical & Metallurgical Society of South Africa.

CHAS. GILLMORE has been appointed superintendent Vigor Powder Works, West Berkeley, Cal.

GOVERNMENT GEOLOGIST PITMAN has been appointed Under Secretary for Mines in New South Wales.

F. W. BAKER, chairman Stratton's Independence Co., and J. H. Hammond are at Cripple Creek, Colo.

B. A. LANGRIDGE, of Boulder, Colorado, is consulting engineer Baca Land Grant M. Co., New Mexico.

H. R. AYRES, Salt Lake representative of the Colorado Iron Works, has returned there from an Eastern visit.

T. W. BUZZO, superintendent Alice Co., Walkerville, Mont., has returned there from Salt Lake City, Utah.

W. S. WARD, commissioner mining and metallurgical department World's Fair, St. Louis, 1904, is in San Francisco.

J. P. BECKER is foreman of development work for the Mount Shasta Co. at the United Copper mine, Copley, Cal.

W. H. CRABTREE, secretary Home-stake M. Co., has returned to Anaconda, Mont., from a trip to California, where he

spent two months looking over the prospects of Placer and Sierra counties.

PROFESSORS BOWMAN AND KING of the Montana State School of Mines are visiting the mines at Rochester, Mont.

JNO. COSGROVE of Anaconda, Mont., has the contract for the erection of a mill for the Majestic M. Co. at Milford, Utah.

M. J. WELCH, late chief engineer Shannon Copper Co.'s plant, Clifton, Arizona, will take up construction work in Chicago.

J. G. ALLYN, M. E., of the firm of Mariner & Hoskins, Chicago, Ill., is near Walcott, Wyo., examining a gold mine for Chicago people.

J. W. GOODMAN, chief engineer the Creston-Colorado Co. at Minas Prietas, Sonora, Mexico, has returned there from Nogales, Arizona.

J. W. CAIRNS is manager Eureka-Ophir group, Dry Canyon, Tooele county, Utah. R. M. Hurst is manager Utah Queen M. Co., same locality.

E. MELARKEY, former superintendent Sheeptrall and Gold Road mines, Arizona, zona, is now foreman Quartette mines, Searchlight, Nevada.

W. H. THOMAS, former manager Niagara Co., Bingham, Utah, has returned there from California, where he has been examining mining properties.

A. F. ROSENBERGER has returned to Nelson, B. C., from the East, where he was successful in securing funds for the development of Camhorne properties.

E. A. HARDY of San Francisco has returned thence from Forest Hill, Cal., where he had been examining the Wisconsin mine, and which he will operate.

H. WITTEBORG, who until recently had charge of the Chamberlain-Dillingham sampler at Breckenridge, Colo., goes as manager of a mine at Los Cerillos, N. M., and takes charge October 15.

H. L. HAEHL and **W. L. EHRICH**, of the Wright-Gilman Co., have returned to San Francisco from a trip to Crescent Mills, Plumas county, Cal., where they have been examining mining properties.

WILLIAM MAGENAU, general superintendent for the Catherine Lead Co. of Fredericktown, Mo., who has been in New England and New York for the past month, has returned to the mines there.

Commercial Paragraphs.

COLORADO is shipping coal to Chicago.

F. G. STREET, 36 La Salle street, Chicago, has taken the Chicago agency for the France metallic packings and Force lubricating pump.

The Guarantee Electric Co., of which Mr. Chas. E. Gregory is president, has leased five big offices and manufacturing space in the building corner South Clinton and Adams streets, Chicago. The business of the company in electrical equipment for mines has increased greatly of late years.

The business of David Cumming, manufacturer of the Cumming portable forge, has become so large that extensions will soon be made to the manufacturing plant at Chicago. The improved Cumming portable forge is a durable and excellent machine, particularly for work in mines or smelters.

FAIRBANKS, MORSE & Co., Denver, Colo., report the following sales: Two 22 H. P. and one 34 H. P. gasoline hoists for shipment to Clear Creek county, Colo. They are just breaking ground for an addition to their storeroom, which will give them double the space they now have, to be completed January 1.

The Pyne Smelter, of West Alameda, Cal., has a railroad rate of \$4.50 per ton on copper ore going over \$30 from Wauhuska, Nev., to the smelter. The charges for working copper ore running over 10% are \$6 per ton. The company agrees to pay the New York market price less 4 1/2 cents—that is, were the market price 12 cents, the shipper would receive 7 1/2 cents. It would, consequently, not pay the miner to ship anything less than 12% ore.

On the 27th ult. the **J. George Leyner Engineering Works Co.**, Denver, Colo., incorporated to acquire the business of J. George Leyner, the rapid growth of the business necessitating enlargement of manufacturing facilities. The company will erect a new plant. The company capitalization is \$650,000. J. George Leyner, president and general manager; Luther H. Wygant, Jr., vice-president; Clarence A. Lawson, secretary-treasurer and business manager.

The Colorado Iron Works Co., Denver, Colo., report the sale of one set 27x14-inch rolls; one set 30x6-inch high-speed rolls; three impact screens, all sectional for mule-back transportation, for Deutz Hermanos, San Luis Potosi, Mexico; machinery for 40-stamp 1000-pound gold mill erected complete ready for operations near The Needles, California, for Mojave G. M. Co.; two sets of 40x16-inch latest design

belted crushing rolls for Economic G. E. Co., Victor, Colo.

The Salt Lake branch of the Allis-Chalmers Co. reports the principal sales for the month of September: Three plunger feeders for the Daly Judge M. Co., Park City, Utah; 80 H. P. return tubular boiler for the Bear Gulch M. Co., Montana; one carload of manganese wearing parts for Gates crushers for the Annie Laurie M. Co.; manganese roll shells for the Daly-West M. Co., Park City; twelve 6-foot Frue vanners for the Trent E. & M. Co.; six improved Chilean mills; one lot of duplicate and repair parts for 1000 H. P. compound engine; two No. 6 and two No. 4 Gates crushers and 12 feeders for the Bamberger-DeLamar G. M. Co., DeLamar, Nev.; carload of roasting furnace parts for the Con. Mercur G. M. Co.

The J. H. Parsons Chemical Co., of Chicago, are sending out a novelty in the shape of packages of volcanic dust from Mt. Pelee. The dust is from the original shipment made to this country and is a curiosity. The business of the Parsons Chemical Co. is reported to have more than doubled during the past two years. They say that with one exception they successfully treated all waters in which their compound was used in that time. Their specialty is with mines that have had feed water.

The representative of the Colorado Iron Works Co., Mr. Charles M. Hampson, has closed a contract for the erection of a cyanide plant at Pluma, South Dakota, for Messrs. Hall & McConnell. The well-known pneumatic process will be used. The plant will have a daily capacity of fifty tons, and will be equipped with six leaching tanks, two solution tanks, two gold tanks and two sump tanks. The Colorado Iron Works pattern zinc boxes will be used. From end to end the building will measure 86 feet. The width will be 44 feet. A 25 H. P. holler and a Leyner air compressor were specified by Mr. Hampson for the pneumatic process. Under the contract the plant is to be completed in sixty days. After working over the old tailings it is the purpose of the owners to run on custom ore.

The United Gold Fields Co. recently placed an order with the J. H. Montgomery Machinery Co. of Denver, Colo., for a tramway and complete mine equipment, including fifty cars, necessary screens and a large amount of track, etc., sufficient to handle the output of their coal mines in British Columbia. The proposed tramway will have a length of 3600 feet and its guaranteed capacity will be 100 tons per hour. The J. H. Montgomery Machine Co. will not only build this tramway but will superintend its erection and install all the necessary machinery to be used at the mine. The Cedar Hill Coal M. Co. have resumed operations at their mine near Trinidad, Colo. They have recently purchased thirty additional coal cars, and a large amount of track and other equipment from the J. H. Montgomery Machinery Co., Denver, Colo., thereby doubling their former output.

New Patents.

DEWEY, STRONG & Co.'s SCIENTIFIC PRESS PATENT AGENCY, 330 Market St., S. F., has official reports of the following U. S. patents issued to Pacific coast inventors:

FOR THE WEEK ENDING SEPT. 30, 1902.
710,035.—ROCKING CHAIR.—C. A. Bergstrom, Tacoma, Wash.
710,037.—VALISE.—C. A. Bodwell, Jr., Lakeville, Cal.
710,246.—FIRE HOSE.—J. Buchtel, Portland, Or.
710,253.—BRAKE.—H. W. Cooley, Lost Valley, Or.
710,251.—VEHICLE AXLE.—J. H. Cooper, Madera, Cal.
710,317.—BOILER FEEDER.—C. Cummings, San Francisco, Cal.
710,147.—ROWING APPLIANCE.—N. B. Goodwin, S. F.
710,454.—DRYER.—I. B. Hammond, Portland, Or.
710,283.—CAR COUPLING.—W. S. Lennon, Tucson, Ariz.
710,180.—MANIFOLD BOOK.—A. Tevison, S. F.
710,329.—EXPLOSIVE ENGINE.—R. C. Marks, San Diego, Cal.
710,320.—CARBURETOR.—R. C. Marks, San Diego, Cal.
710,166.—HAY PRESS.—P. H. McVicar, Livermore, Cal.
710,164.—WRENCH.—M. M. Murray, Baxter, Cal.
710,334.—BOOM RIGGING.—F. V. Nielsen, S. F.
710,336.—GAS APPARATUS.—H. M. Papst, S. F.
710,077.—PIPE WRENCH.—C. C. Rueger, Butte, Mont.
710,078.—EGG STAND.—J. Salomon, S. F.
710,085.—POTATO SLICER.—L. L. Stevens, Los Angeles, Cal.
709,941.—OIL BURNER.—S. M. Trapp, San Diego, Cal.
710,125.—CURING FOODS.—C. B. Trescott, Portland, Or.
710,337.—BUILDINGS.—G. E. Voekel, Los Angeles, Cal.

Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

VEHICLE AXLE.—No. 710,251. Sept. 30, 1902. J. H. Cooper, Madera, Cal. Assignor of one-half to L.

Wilson, Merced, Cal. This invention consists in the formation of the axle with removable ends or stubs as they are called, and means for renewing these stubs and suspenders carried thereby so that whenever they are worn they can be replaced without the expense of cutting off and welding new ones upon the main portion.

PIPE WRENCH.—No. 710,077. Sept. 30, 1902. C. C. Rueger, Butte, Mont. This invention is an improvement in pipe wrenches or tongs and consists of a handle slotted at one end and a movable jaw pivoted in the slot, a fixed jaw on the handle in relation to the movable jaw, said jaws adapted to engage pipes of various sizes, the relation of the grip surfaces of said jaws being such that the angle between a pipe radius perpendicular to the engaged surface of the fixed jaw and a line from the center of said pipe to the center of the pivot of the movable jaw is less than 20 degrees.

Latest Market Reports.

SAN FRANCISCO, Oct. 10, 1902.

METALS.

SILVER.—Per oz., Troy: London, 23 1/2 (standard ounce, 925 fine); New York, bar silver, 50 1/2c, refined (1000 fine); San Francisco, 50 1/2c; Mexican dollars, 43 1/2c San Francisco, 40 1/2c New York.
The steamship Sierra arrived in San Francisco on the 6th, from Sydney, with \$3,500,000 in gold. The specie was in sovereigns. It was one of the largest shipments of gold ever brought from Australia.

COPPER.—New York: Standard, \$10.60@11.00; Lake, 1 to 3 casks, \$11.50; carload lots, \$11.15; Electrolytic, 1 to 3 casks, \$11.40; carload lots, \$11.25; Casting, 1 to 3 casks, \$11.40; carload lots, \$11.25. San Francisco: \$14.00. Mill copper plates, \$17.00; bars, 18@24c. London: £51 18s 9d spot per ton.

LEAD.—New York, \$4.12; Salt Lake City, \$3.50; St. Louis, \$4.00; San Francisco \$4.50, carload lots, 4 1/2c 1000 to 4000 lbs.; pipe 5 1/2, sheet 6, bar 5 1/2c; pig, \$4.75. London: £10 15s per ton.

SPELTER.—New York, \$5.50; St. Louis, \$4.50; London, £19 7s 6d per ton; San Francisco, ton lots, 6 1/2c; 100-lb. lots, 7c.

ANTIMONY.—New York, Cookson's, 9 1/2c; Hallett's, 8 1/2c; San Francisco, 1000-lb. lots, 10c; 300 to 500 lbs., 11c; 100-lb. lots, 13@15c.

TIN.—New York, pig, \$25.00; San Francisco, ton lots, 29c; 1000 lbs., 29c; 500 lbs., 29c; 200 lbs., 29c; less, 30c; bar tin, 30c, 35c. London, £115 5s spot.

PLATINUM.—San Francisco, crude, \$18.00 @ oz.; New York, ingot, \$19.00 per Troy oz. Platinum ware, 75@80c per gram.

QUICKSILVER.—New York, \$48.00 large lots; London, £3 15s; San Francisco, local, \$46.00 @ flask of 7 1/2 lbs.; Denver, \$49.65. Export, \$44.50.

BABBITT METAL.—San Francisco, No. 1, 10c; No. 2, 7c; No. 3, 6 1/2c; extra, 17 1/2c; genuine, 35c; Eclipse, 37 1/2c.

ALUMINUM.—New York, No. 1, 99% pure ingots, 35c; No. 2, 90%, 30c to 34c.

SOLDER.—Half-and-half, 100-lb. lots, 19c; San Francisco, Plumbers', 100-lb. lots, 16 1/2c.

NICKEL.—New York, 50@60c @ lb.; ton lots, 45@48c.

STRUCTURAL MATERIALS.

IRON.—Pittsburg, Bessemer pig, \$22.50; gray forge, \$20.00; San Francisco, bar, 3c @ lb., 3 1/2c in small quantities.

STEEL.—Bessemer hillets, Pittsburg, \$31 and \$31.50; open hearth billets, \$32 and \$32.50; San Francisco, bar, 7c to 12c per lb.

CHICAGO CURRENT QUOTATIONS.
Bessemer.....\$25.00@25.50
Foundry Northern 1.....24.00@26.00
Northern 2.....23.50@25.00
Northern 3.....22.00@23.50
Southern 1.....24.15@26.15
Southern 2.....23.50@25.65
Southern 3.....23.00@25.15
Forge.....20.00@20.65
Charcoal.....25.00@24.50
Billets, Bessemer.....33.00@34.00
Bars, iron.....1.85@1.95
Bars, steel.....1.75@1.85
Rails, standard.....28.00@30.00
Rails, light.....34.00@40.00
Plates, holler.....1.90@2.00
Tank.....1.75@1.80
Sheets, 26 store.....3.25@3.40
No. 27.....3.35@3.50
No. 28.....3.45@3.60
Angles.....1.75@1.80
Beams.....1.75@1.85
Tees.....1.80@2.00
Zeas.....1.75@2.25
Channels.....1.75@2.25
Steel melting scrap.....19.50@20.00
No. 1 railroad wrought.....21.00@22.00
No. 1 cast, net ton.....16.50@17.00
Iron rails.....24.00@25.00
Car wheels.....21.00@22.00
Cast borings.....10.00@10.50
Turnings.....14.00@14.50

CEMENT.—Germania, \$2.45; K. B. & S., \$2.80; Hewmoor, \$2.75; Trowell, \$2.75; Portland, \$3.00 per bbl.

LIME.—Santa Cruz, \$2.00; Roche Harbor, \$2.00 per bbl.

LUMBER.—(Retail): Pine, ordinary sizes, \$20.00@22.00; extra sizes higher; redwood, \$22.00@23.00; lath, 4 feet, \$4.25 @4.50; pickets, \$19.50; shingles, \$2.35 for No. 1 and \$2.00 for No. 2; shakes, \$13.50 for split and \$14.50 for sawed; rustic, \$26.00 @32.00.

NAILS.—Per keg (list prices): No. 20d to 60d, Wire, \$3.30; Cut, \$3.30; 10d to 16d, Wire, \$3.35; Cut, \$3.35; 8d, Wire, \$3.40; Cut, \$3.40; 6d and 7d, Wire, \$3.50; Cut, \$3.50; 4d and 5d, Wire, \$3.60; Cut, \$3.60; 3d, Wire, \$3.75; Cut, \$3.75; 2d, Wire, \$4.00; Cut, \$4.00. Special rates for carload lots.

GENERAL SUPPLIES.

POWDER.—F. o. b. San Francisco: No. 1, 70% nitro-glycerine, per lb., in carload lots, 15 1/2c; less than one ton, 17 1/2c. No. 1*, 60%, carload lots, 13 1/2c; less than one ton, 15 1/2c. No. 1** 50%, carload lots, 11 1/2c; less than one ton, 13 1/2c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2* 35%, carload lots, 9c; less than one ton, 11c. No. 2** 30% carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 728 kegs, \$1.50 per keg; less car lots, \$2 per keg.

CAPS.—3x, \$5.50 per 1000; 4x, \$6.50; 5x, \$8; Lion, \$9, in lots not less than 1000.

FUSE.—Triple tape, \$3.60 per 1000 feet; double tape, \$3.00; single tape, \$2.65; Hemp, \$2.10; Cement No. 2, \$3.00; Cement No. 1, \$2.65, in lots of 3000 feet up.

CANDLES.—Granite 6s, 16 oz., 40s., 10 1/2c @ set; 14oz., 40s., 9 1/2c.

COAL.—San Francisco, coast, yard prices: Wellington, \$8; Seattle, \$6.50; Coos Bay, \$5.50; Southfield, \$3.00. Cargo lots, Eastern and foreign: Wallsend, \$7.00; Brymbo, \$7.50; Pennsylvania, hd., \$14.00; Scotch, \$8; Cumberland, \$12; Cannel, \$9.50; Welsh Anthracite, \$13.00; Rock Springs, \$9.50, long ton; Colorado Anthracite, \$14.00. Coke, \$10.50 per ton in bulk, \$13 in sacks; Sunnyside, \$8.50, long ton.

CHEMICALS.—Cyanide of potassium, 93%-99%, jobbing, 27@28c @ lb.; carloads, 25@26c; in 10-lb. tins, 38c; sulphuric acid, in carboys, 66% B, 2c @ lb.; soda ash, \$2.00 @ 100 lbs.; hyposulphite of soda, 24@30c @ lb.; blue vitriol, 5 1/2@6 1/2c @ lb.; horax, concentrated, 7@8c @ lb.; chloride of potash, 12@13c; roll sulphur, 3c; alum, \$2.00@2.25; flour sulphur, French, 3 1/2@3 1/2c; California refined, 2@2 1/2c; nitric acid, in carboys, 8c @ lb.; caustic soda, in drums, 3@4c @ lb.; Cal. s. soda, bbls., \$1.25 @1.50 @ 100 lbs.; sks, \$1.05; chloride of lime, spot, \$2.50@2.60; nitrate of potash, in bbls, 8c; caustic potash, 10c in 40-lb. tins; sulphide of iron, 9c @ lb.

OILS.—Linsed, hotted, bbl., 57c; cs., 62c; raw, hbl., 55c; cs., 60c; lots of 5 bbls., 1c less; Luboil oil, hotted, hbl., 50c; cs., 55c; raw, bbl., 48c; cs., 53c. Kerosene—Pearl, per gal., 20c; Astral, 20c; Star, 20c; Extra Star, 24c; Eocene, 25c; Elaine, 22c; Water White, in bulk, 13 1/2c; Mineral Seal, iron hbls., 19c; wooden hbls., 22 1/2c; cs., 25c; Mineral Sperm, cs., 26 1/2c; Deodorized Stove Gasoline, bulk, 17c; do., cs., 23 1/2c; 86° Gasoline, bulk, 21c; do., cs., 27 1/2c; 68° Naphtha or Benzine, deodorized, in bulk, per gal., 16c; do., in cs., 22c; Lard Oil, No. 1 hbl., 95c; cs., \$1.05; Neatsfoot Oil, bbl., 75c; cs., 75c; No. 1 hbl., 52 1/2@55c; cs., 57 1/2@60c; Sperm, crude, 60c; Natural White, 65c; Bleached do, 70c; Whale Oil, cs, 55c.

WHITE LEAD.—Per lb., in kegs: Five tons and over at one purchase, per lb., 6c; 1 ton and less than 5 tons, per lb., 6 1/2c; 500 lbs. and less than 1 ton, per lb., 7c; less than 500 lbs., per lb., 7 1/2c; in 25-lb. tin pails, 8c per lb. above keg price; in 1 and 5 lb. tin cans, 100 lbs. per case, 2 1/2c per lb. above keg price. Dry Lead—in bbls., 1 ton and over, 6c; do. in kegs, 6 1/2c.

RED LEAD AND LITHARGE.—One ton and over at one purchase, per lb., 6c; 500 lbs. and less than 1 ton, per lb., 6 1/2c; less than 500 lbs., 7c.

ASSAY LITHARGE.—Per lb., 8 1/2c.
BISMUTH.—Sunbrite, per lb., \$1.60.
BONE ASH.—4c @ lb.
BORAX.—Crystal, 7c; calcined, 25c.
CHROMIUM.—(90% and over) per lb., \$1.25.

COPPER.—Carbonate, 20c; Red oxide, 60c.

MAGNESIUM.—Per lb., \$3.00.

MANGANESE.—(90% and over) @ lb., \$1.25.

MERCURY.—Bichloride, @ lb., 90c.

MOLYBDENUM.—25c. @ gramme; 1000 grammes—2 1/2 lbs.

PHOSPHORUS.—(American) @ lb., 80c.

SILVER.—Chloride, @ oz., 75c; nitrate, 55c.

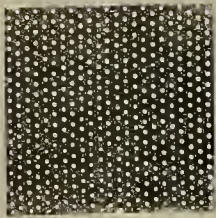
SODIUM.—Metal, @ lb., \$1.00.

URIANUM.—Oxide, @ lb., \$3.50.

ZINC.—Metallic, chemically pure, @ lb., 50c.

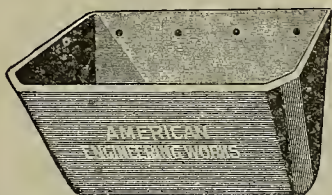
ZINC.—Dust, @ lb., 10c.
ZINC.—Sulphate, @ lb., .04c.
(These prices are wholesale, f. o. b. San Francisco, unless otherwise noted.)

American Engineering Works, CHICAGO, ILL.



We Will Send SAMPLES of Perforated Metal Screens.

Suppose you ask us for samples of such screens as you prefer. We make all kinds—Round Hole, Plain, Diagonal and Horizontal Slot. Indented Slot both Horizontal and Diagonal. We can make our closest quotations on specification of kind and number of sheets required. We also punch Tinned Screens. Get our circular No. 4. If you want to try a set of our screens we will make them for you at a special trial price. We know they are good, and we want every man who has a battery of stamps to have the same knowledge. We are bidding for your permanent patronage and will maintain the quality of our screens with the utmost care.



A COUPLE OF FACTS We Would Like You to Consider:

First, that our E style malleable iron bucket for ore elevators is the best bucket for the money. We drill it for bolts without charge; the material resists abrasion better than sheet steel and is disposed so as to give the greatest wear, being made thickest where the wear comes. It also resists acid water where steel is corroded.

Second, while the grade of iron required in making these buckets has advanced from about \$16 to about \$30 a ton, we have stock and will make scarcely any advance in price of buckets. We will be glad to quote you, or if you will send on your orders specifying how you want the bolt holes drilled we will make the price just as low, because we are bidding for your permanent custom.



Our general discounts on list of

Spiral Riveted STEEL PIPE

are large and liberal, but if you will send us your full requirements, lengths, sizes, pressures to withstand, fittings, etc., we will MAKE YOU A CONVINCING ARGUMENT IN PRICE. We make slip joints and riveted flange joints, but recommend most highly the flanged and bolted joint shown on page 16 of our catalogue No. 18 which we would be pleased to send you.



SPRING STOP COCKS.

We have a long list of customers who are well pleased with our AMEW spring cocks for compressed air lines. They stop the loss of power (often a serious one) by leakage where common cocks are used. Many other mines might use these at a saving. Is yours one of them? We would be glad to have you arrange to try them.

We make sizes $\frac{3}{4}$ ", 1", 1 $\frac{1}{4}$ ", 1 $\frac{1}{2}$ " and 2".

UTAH AGENTS: UTAH MINING MACHINERY & SUPPLY CO., SALT LAKE CITY.
CALIFORNIA AGENTS: RIX COMPRESSED AIR & DRILL CO., SAN FRANCISCO.

SITUATIONS WANTED.

Mining Engineer wants position as superintendent. Practical miner, millman, cyanide and assayer. Experience extending over twelve years. Graduate School of Mines. Address A. R. S. M., this office.

Cyanide Chemist, at present superintendent of cyanide mill, will be open for engagement after the 15th of October. Has been assayer of custom mill and mint. Ten years' practical experience of gold metallurgy in different countries. Address A. B. C., care Mining and Scientific Press, 606 Mack Block, Denver, Colo.

Have had eight years' experience as chief chemist and assayer for large copper smelting companies; since then have been in charge of mines and smelting operations. Would like a position with some good, reliable company; can give the best of reference. Address E. M. C., this office.

Situation wanted by a young mining engineer with a number of years' experience. Has served as accountant, superintendent of cyanide plant, assayer, assistant manager, etc., and is thoroughly conversant with mine and mill work. Position as manager or assistant preferred, though other offers would be considered. Address K. M. C., care Mining and Scientific Press.

COMPETENT SUPERINTENDENT wants position in California; 15 years' experience in running mines, mills and smelters for profit, and managing men. College bred and technically educated. Formerly held positions as assayer, mining engineer, accountant, superintendent, and manager. Member A. I. M. E. High testimonials. Address "Superintendent," Box 813, Seattle, Wash.

INGALLS, DR. A. O. E. M.
Room 17, Sullivan Building, 712 First Avenue,
Seattle, Washington.
Examinations and Reports on Mining Properties.
Investigations of Metallurgical Processes.
Correspondence Solicited.

WANTED.

WANTED.—BY TWO ENERGETIC AND EXPERIENCED mining men the acquaintance of persons interested in the development of mining property in old Mexico. Address D. L. C., care of this office.

WANTED.

SURVEYORS' TRANSITS.
Box 73, Stockton, Cal

WANTED.

Mine or Dump of REFRACTORY ORE,
on working bond or lease.
Address C. W. C., care of this office.

CASH BIDS on 20 Stamp Mill, complete, 1000-lb. stamps. Wanted, First-Class Millwright to erect the same. Wanted, First-Class Superintendent, Machine Drill Men, Miners and Timbermen, Mining Blacksmith, First-Class Electricians—Constructing, Superintending and Operating. Address "Gold Mine," care of Mining and Scientific Press.

BARGAINS.

30 Tons 35-lb. Iron Relaying Rail,
40 Tons 25-lb. Steel Relaying Rail,
50 Dump Cars, 18-in. to 36-in. Gauge,
3 Hoisting Derricks,
100 Horse Power Fire-box Boiler,
25 Horse Power Automatic Engine,
12 Horse Power Side Valve Engine.
S. D. BURNS, 318 BUSH ST., SAN FRANCISCO.

SMITH-VAILE Horizontal Triplex Pumps especially designed for MINE SERVICE.

This type of Pump is especially adapted where long discharge mains occur, as they discharge the water in a constant stream free from pulsation—a very desirable feature under the conditions mentioned.

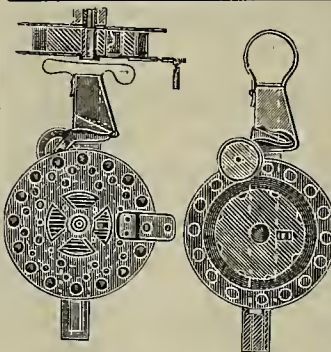
The power exerted is nearly constant at all points of the revolution and consequently is the BEST TYPE OF PUMP for electric motor.

We also make STEAM AND POWER PUMPS for all purposes; FILTER PRESSES for filtering slimes and the separation of solids from liquids; AIR COMPRESSORS and VICTOR TURBINE WATER WHEELS.

IF INTERESTED, ADDRESS

The Stilwell-Bierce & Smith-Vaile Co.

P. O. B. 276. DAYTON, OHIO, U. S. A.



THE CRIPPLE CREEK REEL.

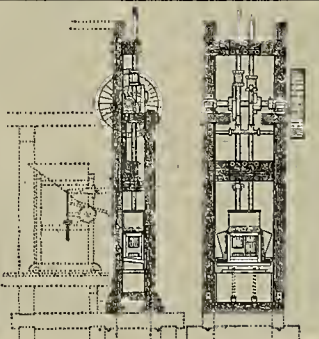
A New Device for Engineers' Long, Narrow Steel Tapes.

It was evolved from ten years' experience with all reels manufactured. The only reel invented that does not require a man with three hands to operate. It does not tire the left wrist to hold it or the right hand to turn it. You can lay it on the ground or hang it on a tree and pull out the full 500 feet, or stop it at any point and the tape will not unwind or tangle. The only reel with an automatic resistance on the tape itself and not on the spool. It is the lightest durable reel made. It saves broken tapes, time and profanity. Suitable for any make, any width, any length of tape. PRICE \$10.00.

PATENTED, MADE AND SOLD BY

V. G. HILLS & J. E. CHAPSON,

Box 1119. CRIPPLE CREEK, COLO.



MODERN MINING MACHINERY.

QUARTZ MILLS of any capacity,
IN UNITS OF TWO AND FIVE STAMPS.

Acme Amalgamators for Beach Sands
and other placer mining. Successfully applied to quartz mills in addition to or displacing stamps.

SUCCESSFUL GRAVEL MILL RECENTLY IMPROVED.
Special Gold Dredging Pumps and Machinery. Concentrators, Feeders, Rock Breakers and Power Plants.
Largest manufacturers of Irrigation and Reclamation Pumps in the United States.

Catalogues: No. 20, Pumps; No. 22, Beach and River Sands; No. 25, Mining.

Krogh Manufacturing Co.,

Office, 519 Market St. Works, 9-17 Stevenson St.
SAN FRANCISCO, CAL.

MINING AND SCIENTIFIC PRESS

Whole No. 2204.—VOLUME LXXXV.
Number 16.

SAN FRANCISCO, CAL., SATURDAY, OCTOBER 18, 1902.

THREE DOLLARS PER ANNUM.
Single Copies, Ten Cents.

Settlement of the Coal Strike.

If "in a multitude of counsellors is safety," then there should long ago have been a satisfactory settlement of the dispute between Eastern coal mine operators and miners, for thousands have counseled and worked, with no definite result till the President of the United States took a prominent part therein. The strike is in its sixth month, and the loss may be conservatively estimated at \$100,000,000. The most serious phase of a most serious situation is the tendency in high and low places to the theory that the Government has the right to take possession of the mines and work them for the public benefit. It is argued, and with great show of truth, that the question is of more importance to the public than to either party in the controversy; that coal is a public necessity, and that in the interest of the greater number the Government owes it to its citizens as a duty to see that coal is supplied in suitable quantity as required.

There certainly is as good reason in this case as was ever put forth why favorable argument should be made for public ownership of such things, but it is dangerous doctrine. In such a matter the question is not "Where shall we begin?" but "Where will we end?" and the end of all that is anarchy. Of course, if anarchy be deemed desirable, if Proudhon's dictum that "property is robbery" be our shibboleth, then let us all hasten to say so. If it be "a dreadful thing to be poor, therefore let us all be poor," then let there be no humming and hawing about it, but declare for universal poverty off-hand. Many may advocate hastening the reign of anarchy, but those who prefer the working of natural law in the business world will hesitate joining the ranks of willful destructionists.

The attitude of the operators till this week did much to make popular the idea that the right of eminent domain should be immediately exercised. That menace may be thought well to hold over them as a club, but the time has not come when the majority of thinking American citizens want to face the multitude of manifest evils that would result from universal dispossession.

The miners asked that they be guaranteed an increase in wages for men employed on piece work; a reduction in hours of labor for men employed by the day; payment for a legal ton of coal, and that coal shall be honestly weighed and correctly recorded. This is the sum and substance of their grievance. The operators now are willing to concede the point of arbitration, but disclaim any intent to deal with the miners as individuals. At the bottom of it all is plainly the feeling that the Eastern coal mine owners do not desire to recognize the Miners' Union representatives. Each



Fig. 1—Bird's-eye View of Savage Basin, San Miguel County, Colo. (See Page 221.)



Fig. 2—Tomboy M. Co.'s New 60-Stamp Mill, San Miguel County, Colo. (See Page 221.)



Fig. 3—Tomboy M. Co.'s Boarding-House, San Miguel County, Colo. (See Page 221.)

side has defied the law. The operators violated the Sherman anti-trust law and the constitution of Pennsylvania. The strikers have broken the statutory enactments against riot and personal violence. Partisans of each side condone the unlawful acts of those whom they favor.

With true American optimism, the most of us who are not coal mine owners or coal miners are glad to see so ruinous a war ended before further loss is occasioned. The thing will be patched up and coal got out to supply pressing public demands. But the sore is there and is not healed in any such way. Just how it can be healed is hard to say; not by government ownership—rather by the exercise of the homely virtues of justice and forbearance and the realization on both sides, and on all sides, of the rights and duties of the true American citizen. The whole thing is the bitter fruit of hossoms blown to us from across the sea. Both sides, impelled by a sense of common danger,

will get together and an armed truce will result, during which time the immediate needs of the miners and the public will be supplied. The idea in making editorial reference to the subject herein is to indicate the futility of using the matter as a reason for government ownership. True, it furnishes an excellent argument to those who look only at the present, but no argument can effectively plead for such perversion of public progress and human effort. That question is not one of sentiment, but of business economy. Whatever the Government does now costs more than twice as much what it would if done by private enterprise, and in that lies the insuperable objection.

The best and only form of "government interference" that can be advocated in this case is the creation of a government Department of Mines and Mining, with a cabinet officer at its head. That would not be governmental control, but would constitute governmental recognition, and would greatly aid in producing better relations between coal mine owners and coal miners. This last deplorable difference is one of the things that could be more largely obviated by such governmental department than in any other ordinary way.

The whole thing—viewed from that standpoint—affords one more tremendous object lesson for the need of a government Department of Mines and Mining. It is not thought that such a department could prevent such a gigantic strike as that which has paralyzed many Eastern industrial activities during the past ninety days, but its wise administration could go far toward smoothing and preventing the causes that make such strikes likely to occur. A government Department of Mines and Mining, rightly run, could do much for the metal and non-metal mining industry of the country, and its operation would be economical in helping to allay or avoid the conditions that occasion such industrial strife.

MINING AND SCIENTIFIC PRESS.

ESTABLISHED 1860.

Published Every Saturday at 330 Market St., San Francisco, Cal.

TELEPHONE, DAVIS 771.

ANNUAL SUBSCRIPTION:

United States, Mexico and Canada.....\$4 00
All Other Countries in the Postal Union.....5 00

Entered at the San Francisco Postoffice as second-class mail matter.

Chicago Office (Telephone, Harrison 73).....737 Monadnock Block.
Denver Office (Telephone, Olive 733).....606 Mack Block.

J. F. HALLORAN.....Publisher.

San Francisco, October 18, 1902.

TABLE OF CONTENTS.

ILLUSTRATIONS.—Bird's-eye View of Savage Basin, San Miguel Co., Colo.; Tomboy M. Co.'s Boarding House, San Miguel Co., Colo.; Tomboy M. Co.'s New 60 Stamp Mill, San Miguel Co., Colo.; 215. Illustrating the Jeyoux System, 220. Klein's Combination Classifier, 221. Mining and Metallurgical Patents, 223-224.

EDITORIAL.—The Coal Strike, 215. Influence of Mining on Mechanical Progress; Magnetic Separation of Ore; A State Mining Bureau for Oregon; A Deterrent of Fraud; Harmonizing with Oriental Ideas; U. S. Patent Office; Mine Book-keeping, 215.

MINING SUMMARY—225-226-227-228-229.

LATEST MARKET REPORTS—230.

MISCELLANEOUS.—Concentrates, 217. Some Questions and Answers, 218-219. Mine Signaling by Compressed Air; A New Way to Get Levels, 220. Klein's Combination Classifier; The Tomboy Mine. Smuggler, Colo., 221. The History of a Catalogue; Velocity and Discharge of Water; Through Submerged Orifices; Recent Coal Labor Statistics, 222. Notes on the Treatment of Zinc-Precipitate Obtained in Cyaniding New Zealand Ore; Using Technical Papers Intelligently, 223. Mining and Metallurgical Patents, 223-224. Personal; Commercial Paragraphs; Notices of Recent Patents; New Patents, 229-230.

THE influence of mining on modern mechanical progress is noticeable. A century ago there was a wide gap between mining and engineering, or between metallurgy and mechanics. The necessity for pumping water out of a mine was the chief factor in the evolution of the steam engine, and, in return, the main factor in the development of the iron and steel industry was when the steam engine enabled air to be readily pumped into the blast furnace employed for the production of cast iron. The first railway was in a mine, and from that idea was evolved the great lines of railroad that traverse the earth.

MUCH has been said concerning Thos. A. Edison's experiments at Orange, N. J., on magnetic separation of ore and the subsequent extensive and expensive tests in New Mexico, which latter are reported as having been abandoned after the expenditure of several hundred thousand dollars. It is understood that the cessation by Mr. Edison of active work in that direction can not be considered wholly as an abandonment, rather as a temporary stoppage consequent upon present untoward commercial conditions. It is stated that the ore treated was found to be only 20% to 25% magnetic. The process consisted in separating magnetically, briquetting and reducing in the blast furnace. The cost per ton was 60 cents too high, but "the process might become valuable if the richer ores become scarce." The ore was contained in a hard granite. Phosphorus was present, and hence it was necessary to grind finely. Acid treatment had been tried, but it was necessary to dry the ore before it could be separated.

OREGON proposes this winter to establish a State mining bureau. It is a good idea. Every mining commonwealth should have such a State department. Every dollar so spent would be the means of inducing inquiry and development. This is an age of advertising, and no matter how good the wares of the merchant or how valuable the mineral resources of a State, both need proper publicity among buyers. Washington, Idaho, California, Colorado and Montana find it profitable to maintain such an institution, and Oregon could well profit by their example. That State is the possessor of great mineral wealth. Rightly run, an Oregon State Mining Bureau could induce investment, disseminate accurate information and be of great aid in a variety of ways to Oregon mining men. The Oregon Legislature could well appropriate, say, \$25,000 annually for the maintenance of a State mining bureau. Its good effects would be manifest and would be immediately noticeable. It is indirectly as much of an advantage to the farmer or lumberman or stock raiser or merchant as

it is to the miner to have such an institution. Mining is the great basic industry of the nation. The miner is a consumer of all products, a customer of all manufactures, and a competitor of none.

A Deterrent of Fraud.

The activity of the California State Mineralogist in inquiring into the truth or falsity of statements made by representatives of real or imaginary California mining property is the subject of some strong protest. It is represented that the sole province and purpose of the California State Mineralogist is to run the California Mining Bureau, wisely expend the public money, mind his own business, and let the private business of others alone.

This thing opens up an interesting field of discussion. The California State Mineralogist has certain duties prescribed for him, and among those duties as an executive officer it is not stated anywhere that he shall have anything to do in any way with sales of mining property, of investments therein, nor of passing upon the worth or lack of merit of any proffered stock.

Still, there are attendant circumstances that are worth considering in an impartial review of the State Mineralogist's "pernicious activity." He is a citizen of California, presumable of some intelligence, and supposedly a well-wisher of the commonwealth that has honored him with executive charge of the State's mining bureau. As such, it is his province and privilege, even though it be not his duty, to aid in the advancement and development of the State's mineral wealth, and as a loyal citizen, as a man of some intelligence, and as a citizen, he can in common with other good citizens do some good in exposing fraud wherever it may exist. He is not tramping up and down the State breathing fire and slaughter; but it is believed that in some notable instances he has exposed some mining schemes in which innocent and well-meaning people were saved some silly expenditure. In so far as this applies, it is our opinion that the State Mineralogist or anybody else deserves commendation and should be upheld and endorsed.

Of course, we are fully aware that there is no law in Iowa or Massachusetts or North Carolina to prevent anyone living therein making a fool of himself if he feel so disposed, and further, of course, there be those resident therein and elsewhere who abuse the privilege, and still further, of course, if these people are not skinned in one way they will be in another; yet it is not a good thing for any mining State to knowingly allow swindles to be perpetrated, and if any citizen thereof in or out of office can help in exposing such frauds he does the State a service.

The whole thing is a cold, selfish proposition. If fakes flourish, honest men ultimately lose opportunity for mining investment, being discredited and classed with the fakers by those who know no better; whether foolish clergymen or servant girls or factory employes lose their money is their lookout; but in the interests of the State such schemes as are dishonest should be repressed, just as a police officer would arrest a bunco steerer, or the town marshal lock up a backdoor thief. If the citizen occupying the California chair of State Mineralogist by reason of such fact is better able to check, with intelligent discretion, fraud, because of such occupancy, so much the better for the State.

THE large circulation of this paper in the Orient warrants the suggestion that manufacturers, merchants, exporters and shippers, men in general who expect to do business can get trade best by harmonizing most with Oriental ideas. The plans and ways that Americans adopt are excellent—for America—but trade with the Orient is best and quickest induced by compliance with Oriental ways. Of course, our way is the best; but if we want their business, we must conform to the customers' ideas to a certain extent. The swift hustle of business approach and capture which we so much admire and practice is viewed with suspicion by the Oriental mind in which the doctrine of delay prevails. Patience is an essential virtue in dealing with our trans-Pacific neighbors. From the American standpoint, slow beginnings and small profits are sometimes unworthy detailed attention, but it is from such diplomatic and delayed action ultimately arise larger profits and permanent trade so far as the Asiatic is concerned.

They are an ancient people with archaic ways, wise in their generation and slow to welcome innovation. Our breezy bustle stuns them. There is business there—abundance of it—but it can not be grasped immediately. The very qualities that make Americans successful among modern peoples repel the Oriental. It is a question of choice. If we want to sell goods quicker elsewhere, and the Oriental trade is too slow a proposition for Americans, well and good; but if we propose turning the Pacific ocean into an American lake and binding the Orient to us with the bonds of business, we must conform to the requirements of the party of the second part.

U. S. Patent Office.

The weekly illustrated descriptions of the latest mining and metallurgical patents have long been a feature of this paper. In this way our readers are fully abreast of current progress, invention and improvement therein. In this regard the magnitude of the business of invention is noticeable. The report of the commissioner of patents for the year ending June 30, 1902, shows that during that one twelve months were received at his office 53,107 applications. Those who sometimes wonder why their application for a patent is so long delayed may be interested in knowing that on that date (June 30, 1902) there were 11,042 applications still awaiting action in the patent office. When one considers the enormous number of applications and the limited capacity of the office, the wonder is that there were not more held up at Washington. Another interesting item in the report of the commissioner of patents is the line, "Letters patent withheld for non-payment of final fees, 4123;" and still another, "Applications allowed awaiting payment of final fees, 7448." Uncle Sam does business on a C. O. D. basis.

For the first time in any twelve months, for the year ending June 30, 1902, the number of applications exceeded 50,000. The receipts for the year were \$1,491,538 85, the expenses \$1,329,924.63, showing a surplus of \$161,614.22. The patent office is a constant source of revenue to the Government, and deserves better treatment. It has all along been self-supporting, but is continually pushed into a corner and made subordinate. Every commissioner for thirty years has begged for better quarters, increased office facilities, and clearly shown that it is not fair to inventors nor to the inventive genius of the nation to tax inventors to so great an extent as to make the office a source of profit to the Government, and yet he so stingy or neglectful in withholding required office room and facilities for handling the ever-increasing volume of business.

RECENTLY appeared editorial reference to the constant necessity of exact system in mine accounts, organized mine book-keeping for mining or metallurgical concerns of sufficient consequence to warrant the employment of such a system of checks and balances as would guard against mistakes or fraud. The need and manifest advantage of such a set of books is often made apparent. If reports from Cananea, Sonora, Mexico, be true, it would have been business for the Copete mine of the Cananea Con. Mining Co. to have had some such way of guarding against loss. According to reports from there, a steal involving \$30,000 has been discovered in the cashier's office and four employes therein are arrested. It is stated that in the Cananea Co.'s way of paying its men, which is a banking system, each employe is given a passbook—a cartero—in which he is credited with his work from day to day. The men are paid off once a month, and they can draw orders, called boletos, on the company's store agent. Their accounts in their carteros, these boletos, are payable to bearer. It is stated that there was no system of checking up these boletos against the hooks of the timekeepers, so that four young office employes conceived the plan of issuing boletos promiscuously and selling them, which they did at the ruling rate of 90 cents on the dollar. Four thousand dollars is alleged to have been traced against them, but it is stated that they have gotten the best of the company to the amount of about \$30,000. The discovery of the frauds was made by checking these boletos against the checkbook, which contained a correct list of the employes. The boletos showed only a lot of dummies.

Concentrates

So far as known Africa is barren of silver.

A CISTERN OR TANK $9\frac{1}{2}$ feet diameter, 12 feet deep, will hold just 200 barrels water.

FOR plating silver when batteries are used for circuit, the cyanide of silver is of general use.

THE absorption of small quantities of nitrogen by pure iron renders it hard and brittle like steel.

G. G. BLACKWELL SONS & CO., Liverpool, are English buyers of molybdenum and vanadium ores.

AT a depth of 1800 feet is found the highest temperature—72° F.—in the copper mines of Butte, Mont.

FIVE THOUSAND FEET of $1\frac{1}{2}$ -inch pipe, 4000 feet 2 $\frac{1}{2}$ -inch and 2000 feet 3-inch is equivalent to 20,380 feet of 1-inch pipe.

AN ounce of gold will buy three times as much now as when California's annual gold product was three times what it is now.

TO operate a hydraulic elevator with a 2-inch nozzle, there being 150-feet head, would require about 100 miners' laches.

BUT seventy-four more days remain to do the required annual assessment work on unpatented mining claims located since Jan. 1, 1901.

EPSOMITE is a growth of silvery white hairy substance, a crystallization from cinnabar in place when exposed to the air for some time.

GOLD AND TIN together in place is an unusual combination. The Royal Tasman mine, near Gladstone, north-eastern Tasmania, is cited as such a case.

AN arrastra beats nothing, but it is of no account for low-grade ore. How to build and operate one has been described and illustrated herein repeatedly.

WHERE twelve men are employed in a mine daily, and there is a perpendicular shaft or incline 300 feet in depth from the surface, the California mining law requires a second mode of egress therefrom by shaft or tunnel.

NO MATTER what definition is given the word "apex," it will be contradicted. Probably this will be contradicted as little as any: The part from the foot wall to the hanging wall at the top of the lode nearest the surface is the apex.

THE "pocket region" of Tuolumne county, Cal., is in the mineral slates that traverse and bisect the lime belt on the western slope of Bald mountain. But from the Stanislaus to the Tuolumne river are rich gold-producing mines of considerable depth.

TO carry 1000 miners' inches of water, total fall from inlet to outlet of 18 feet in a length of 600 feet, maximum depression of pipe below inlet 40 feet, the pipe should be 21 inches diameter. The velocity of flow of water in the pipe would be about 11 feet per second.

TWO HUNDRED FEET HEAD and 200 miners' inches water per minute would give, theoretically, 193.176 H. P. With 200 feet head and 400 cubic feet water per minute, the theoretical horse power would be 128.784. A head of 200 feet would give a pressure of 260 pounds.

THERE are several devices patented and unpatented to prevent the formation of fumes in mining powder. One patented by R. Crowe of Georgetown, Colo., some years ago consists of 50% unbolted wheat flour, 25% common salt (finely ground), and 25% pulverized bicarbonate of soda.

BARREL COPPER is native copper occurring in pieces of a size to be sorted out by hand in sufficient purity for smelting without mechanical concentration. Mass copper is the native form occurring in large masses. Ingot copper is the cast article in the form in which it comes from the molds.

AN assay is all right to determine the value of the piece of ore assayed, but to decide on the building of a plant at least one correct mill test is necessary. Even then further experiment and experience is necessary to determine the best way of working the ore; \$500 so spent is better than to take chances of useless expenditure of \$50,000 later on.

MINING MEN visiting San Francisco are invited to make this office, 330 Market St., headquarters. When visiting Denver the paper's representative will make them equally welcome in the commodious office at 606 Mack Block. When in Chicago, the central west manager will be pleased to see them at the paper's Chicago office, 737 Monadnock Block.

IT has been stated that electricity will develop "one horse-power" of energy for one hour at a cost of 1 cent, and that to develop the same energy with wood, coal or petroleum costs $3\frac{1}{2}$ cents per hour; but, like all those general statements, it may be true in one locality or under one set of circumstances and quite the reverse in another case. As a general rule, it is not correct.

AIR will flow from a tank having a gauge pressure of 100 pounds into a tank having a gauge pressure of 80 pounds through a short pipe connecting the two tanks at a velocity of 587 feet per second; when the gauge pressure in the tanks is 100 pounds and 60 pounds, 864 feet per second; when 100 pounds and 40 pounds, 1055 feet per second; when 100 pounds and 20 pounds, 1360 feet per second.

THE term "degree Baume," referring to oil, indicates its specific gravity. The higher the degree Baume the lighter the oil. Crude oil as it is usually found has a de-

gree of about 16° B., or a specific gravity of about 0.960. The illuminating oil has a degree of about 46° B., or a specific gravity of about .802. Gasoline has a degree of about 60° B., or a specific gravity of about .740.

IT is not considered that crushing to 30 or 40 mesh would give as high a percentage of extraction by simple amalgamation as crushing to 50 or 60 mesh. However, the size to which fine-milling gold ore should be crushed to yield the maximum profit is largely a local question for individual solution. And it is pre-eminently a question of profits. If there is more net profit in saving 90% than in saving 92%, the former would seem to be the best practice—from a commercial standpoint.

TO secure determination of silver in residuum from zinc distillation, a mixture of twenty grains of the coarsely powdered residue with forty grains of potassium nitrate and ten grains of sodium peroxide is dropped in portions of three or four grains into a red hot iron crucible. When the reaction is finished a sufficient quantity of flux (fourteen parts sodium carbonate, eight parts borax glass and two parts of cream of tartar) is added, and then ten grains of litharge. The lead button obtained from the fusion is cupelled in the ordinary manner.

ON an average the temperature of the air falls 1° for every 300 feet ascent above sea level. If the barometer stands at 30° at sea level it will indicate 29 inches at an altitude of 910 feet, and 28 inches at 1850 feet. At 16,000 feet the barometer would stand at 16 inches; at 30 miles high it would read .005 of 1 inch, and at 45 miles the barometric reading would be too small to be made, the air being too thin to produce sufficient pressure to be measured by a barometer. But in an extreme state of tenuity air undoubtedly exists 100 miles beyond the surface of the earth.

IF steam is at 100 pounds by the gauge (115 pounds absolute or total), its temperature is 337.68° F., and a pound of it contains 1184.9 heat units above 32° F. A pound of water at 32° F., if changed into steam at 100 pounds pressure, will receive 1148.9 units of heat, of which 308.5 units were given to it while yet water as the temperature was raised from 32° to 337.66° F., and 876.5 units have become latent in the steam as the pound of water at 337.66° F. was changed into steam at 337.66° F. A cubic foot of steam at 100 pounds pressure weighs 0.2583 pounds (about four ounces), 3.872 cubic feet weigh a pound, a cubic foot of water in the boiler at 337.66° F., weighs 56.18 pounds.

NO COMBINATION of wall rocks will insure a rich vein. It does not seem reasonable that gold should have been derived from the walls, for mines are equally rich whether in slate or at the contact of slate with greenstone. Good mines as well as poor ones can be found under either of these conditions. It seems more reasonable to believe that the deposition of the metallic particles is dependent more upon chemical reactions of a certain kind. Of two veins lying side by side in the same mine, one may be barren and the other constitute the pay rock. The rock forming the walls upon the surface or at any depth which can be reached is no indication of the nature of the deep-seated rocks from which the hot waters abstracted their mineral contents.

ALL original pyrites of small grain texture contain gold to a greater or less extent. Of course, this does not cover such secondary large crystal pyritous deposits derived from veins. It is not yet known whether the gold in this pyrites is in chemical combination with the sulphide of gold or whether each minute particle of gold is simply covered with a coating of sulphide of iron, or whether the particles of gold are in the metallic state, but alloyed with silver or other metal which combines more readily with sulphur than the gold does, and consequently forms a coat of sulphide of silver over the gold. The particles of gold are so minute, and the combinations follow so rapidly during the splitting up of these pyrites, that the finest instruments and tests known to chemistry have as yet been unable to settle this part of the question to the satisfaction of all concerned.

IN the manufacture of aluminum alloys containing aluminum, zinc and copper, a great deal of difficulty has arisen in providing a crucible which is not only proof against the alloy, but which will not injure it. It must be of such a nature that it will not alloy with the zinc or aluminum, and, furthermore, it must not have silicon in its make-up. A composition for lining crucibles which obviates the above objections consists of oxide of copper and the oxide of manganese in the proportions of one part of the former to four parts of the latter. The mixture is used by mixing it with water to form a paste, which is plastered upon the inner wall of the crucible to a depth of $\frac{1}{2}$ to $\frac{3}{4}$ inch. Before the oxide of manganese is used for this purpose, however, it is fused by submitting it to a temperature of 2000° C., after which it is reduced to a powder. The lining having been plastered in position, the crucible is dried and submitted to a baking process. This will partially fuse the oxide of copper, which will form a binder between the particles of manganese.

ALL material substances will conduct electricity. Some of them—as, for instance, silver, copper, aluminum, iron, lead and water—offer relatively little resistance to the passage of the current, and are, therefore, spoken of as conductors. Among these copper has taken the first rank in the manufacture of insulated wire and cables, because it combines in a higher degree than any of the other metals the qualities of ductility, strength and conductivity, with generally reasonable price and minimum size. Other substances—as, for instance, glass, porcelain, mica, gutta percha, India rub-

ber, dry air, cotton and jute yarn, paper, resin and hydrocarbons—offer so much resistance to the passage of the electric current that they are termed "insulators," and are all used in one way or another to insulate or prevent the escape of the electric current from the conductor. Thus electric wires on poles and house-tops are practically always attached to glass or porcelain insulators. Mica is used extensively in the manufacture of electrical apparatus, while yarn, paper, India rubber and gutta percha, because of their easy manipulation, are applied to wires for use in cables or inside of buildings, or overhead in cities when the current to be transmitted is one that would be dangerous to the public. The resins and hydrocarbons are used only for saturating the fibrous insulators.

IN all reciprocating engines there is an intermittent speed, the speed gradually increasing during the stroke until such time that the power applied is less than the mean power absorbed, after which the speed gradually decreases until steam is again admitted. It will thus be seen that in every single crank engine there is during each stroke or each half revolution a period of increasing speed and one of decreasing. With two cranks at 90° there will be four such periods during each half turn. With cranks set 120° apart there will be six such periods. The amount of fluctuation in speed is dependent on the number of cranks, the weight of the reciprocating parts, the length of the connecting rod, the proportion and adjustment of the valves, and the weight of the fly-wheels. It is desirable to keep this variation within certain limits on account of the parallel operation of the generators, but more particularly to insure the satisfactory operation of synchronous apparatus, such as synchronous motors and rotary converters, from such circuits.

DIAMETER of a circle $\times 3.1416$ = circumference; diameter of a circle $\times .8862$ = side of an equal square; diameter of a circle $\times .7071$ = side of an inscribed square; square of a diameter $\times .7854$ = area of a circle; circumference of a circle $\times .31831$ = diameter; side of a square $\times 1.128$ = diameter of equal circle; square root of an area $\times 1.12837$ = diameter of equal circle; square of the diameter of a sphere $\times 3.1416$ = convex surface; cube of the diameter of a sphere $\times .5236$ = solidity; diameter of a sphere $\times .806$ = dimensions of equal size; diameter of a sphere $\times .6667$ = length of equal cylinder; square inches $\times .09695$ = square feet; cubic inches $\times .00058$ = cubic feet; cubic feet $\times .03704$ = cubic yards; cylindrical inches $\times .0004546$ = cubic feet; cylindrical feet $\times .02909$ = cubic yards; cubic inches $\times .013607$ = imperial gallons; cubic feet $\times .6232$ = imperial gallons; cylindrical inches $\times .002832$ = imperial gallons; cylindrical feet $\times 4.895$ = imperial gallons; 183.346 circular inches = 1 square foot; 2200 cylindrical inches = 1 cubic foot; avoirdupois pounds $\times .009$ = hundred weight; avoirdupois pounds $\times .00045$ = tons; lineal feet $\times .00019$ = statute miles; lineal yards $\times .000468$ = statute miles.

ANY combination of metals or substances acted upon by acids so that the chemical action will produce electrical action may be called a primary battery. When wood is burned the carbon of the burning material combines with the oxygen of the air, and heat is given out as a result of the chemical combination, which we call combustion. In a similar manner if a piece of zinc be placed in some sulphuric acid, the acid combines with the zinc, and, as a result of the chemical combination, heat is given off. Of course, heat represents a certain energy or capacity of doing work. It has been discovered that under certain conditions the energy in this manner represented by chemical action is productive of electrical action, and, taking advantage of this, we get electric batteries. When two different metals are placed so that they do not touch each other and immersed in a liquid which will attack them chemically, one of these plates will become a positive pole and the other negative, to a current of electricity that will be produced by the chemical action and be caused to flow over a circuit which is connected to the exposed ends of the plate. A jar or vessel containing two plates thus immersed in a solution of acid or acidulated water is called an electric battery cell and the plates are called the electrodes of the cell. It is customary to speak of the electrode from which the current is flowing as the positive pole and the other electrode is known as the negative pole, the difference of electrical pressure between the two elements is known as the electro-motive force or voltage of the battery—that is, the current will leave the positive pole at a certain pressure or force, consequently will have the power of doing work in a circuit which is connected to the two plates of the cell. The current of electricity produced in this way not only flows from the positive plate to the negative plate through a circuit, but also flows within the cell itself from the negative plate to the positive one, consequently the negative plate will be known as the positive element of the battery, while the positive pole is known as the negative element. We might illustrate the action of an electric battery cell by saying that the cell performs the same function to the electric energy set in motion, as a pump would that had its discharge pipe connected to the point where the water is taken in, to the flow of water in the pipe. Now, if the pump be set in motion, it will force the water to circulate through the pipe and also within itself, the pump acting as the motive power of the circuit. Just so in a battery, electrical action is produced by the cell and the chemical action is the motive power of the circuit.

(Several questions and answers are given more extended notice on the next two pages.)

Some Questions and Answers.

(The following is an overflow from "Concentrates" page:)

Where can I find a market for graphite? What is its now worth?

Salida, Colo., Sept. 30.

The artificial production of graphite at Niagara Falls, N. Y., at a cost of less than 5 cents per pound, has so demoralized the market for natural graphite and made its production so uncertain as to profit that it is not possible to state that a profitable market for graphite mined in Colorado could now be found. Mined graphite brings from \$7 to \$18 per ton in New York City, variation due to quality.

Give a good example of where zinc dust is used in cyanide work. What are the appliances? That is, how is the zinc dust put in the cyanide solution? Please give a detailed account of the process.

Chicago, Sept. 27.

At the Golden Gate mill, Mercur, Utah, precipitation of the gold from the solution is effected by means of zinc dust. The material used is the blue powder by-product obtained in zinc smelting. The dust used by the company is imported from England or Germany, and contains about 90% metallic zinc. The solution is pumped from the gold solution tanks to the precipitation tanks, of which there are three. Thirty tons of solution is a charge for precipitation in each tank. While the tank is filling, air at ten to fifteen pounds pressure is blown into the solution through a half-inch pipe, keeping it in a state of violent ebullition. This is done to stir up the precipitate that has settled to the bottom of the tank from former charges, and which contains a large amount of unconsumed zinc. Five pounds of fresh dust is used for every charge of thirty tons, this amount being sieved in, beginning when the tank is half full, and continuing the additions at intervals until the tank is full and the zinc has all been added. The air pipe is then moved about the bottom of the tank for a short time, to thoroughly stir up all sediment again, and then removed, and the suspended matter allowed to settle about half an hour, when the supernatant solution is drawn off through an opening in the side of the tank 8 inches above the bottom, and as it still contains considerable quantities of suspended gold slimes, it is passed through the filter presses to collect these, and runs from them direct to the barren solution sump. It is seldom necessary to use pressure to force the solution through the presses, other than the head of 18 feet between them and the bottom of the precipitation tanks, but sometimes this has to be done when the presses become well filled with slimes, and for this purpose two pressure tanks of thirty tons capacity each are suspended beneath the precipitation tanks, and connected with them by large pipes, so that a tank of solution can be discharged into them in a very few minutes, and thence forced through the presses, and when it becomes necessary, the solutions can be banded in this way as rapidly as when the presses are free to work by gravity. The filtering medium used in the presses is two layers of light cotton flannel, between which is placed a sheet of heavy unsized paper. The precipitating and filtering operation is continuous, as while one tank is filling another is discharging and the third settling, and by this system as much as 2500 tons of solution has been precipitated in three tanks in twenty-four hours. The dust precipitate is almost instantaneous, being complete in a sample taken at once after the last zinc has been added. The precipitated solutions, after passing presses, rarely exceeds 20 cents per ton in value and are usually lower. The consumption of zinc dust is about one and a third pound per ounce of gold recovered.

In your issue of June 14, 1902, you state that there are about 2000 different minerals, but only forty of any importance to the miner. I would be pleased to learn the names of the forty you consider of importance.

Chemulpo, Korea, Sept.

Gold, platinum, iridium, silver, palladium, rhodium, copper, cobalt, nickel, iron, osmium, manganese, bromine, tungsten, tellurium, sulphur, bismuth, coal, antimony, water, lead, tin, zinc, carbon, potassium, calcium, sodium, quartz, granite, slate, mica, feldspar, mercury, aluminum, arsenic, silicon, lime, borax, molybdenum, diamonds and the host of precious stones, etc.

Please decide as to the date from which a mining location should commence in regard to doing the annual assessment work. Does it commence at date of location or at time of recording? In the case of a claim located Nov. 25, 1901, and recorded Feb. 25, 1902, does the work have to be done in 1902 or 1903? The State law here is to give ninety days from date of location to time of recording—that is, a 10-foot hole 4x6 feet must be finished before a claim can be recorded. Now, can this work be credited as part of the annual assessment?

Tonopah, Nev., Oct. 15.

The date from which time is counted begins at the location. Hence on the claim located Nov. 25, 1901, the \$100 of work or improvements required by the federal statute must be done before Dec. 31, 1902. If there were \$100 of work or improvements put on the claim before Dec. 31, 1901, that would hold it no

better than that amount done before Dec. 31, 1902; but whatever amount of work was done on the claim in 1901, there must be at least \$100 additional done between Jan. 1, 1902, and Dec. 31, 1902, to hold it from being jumped Jan. 1, 1903. This is fifteen pages of law boiled down.

We wish your opinion on the following: An undeveloped group of mining claims was sold by A to B, C and D. A makes deed of whole property to B without any reserve. B, C and D enter into an agreement with each other, specifying the interest of each in the property, and that B holds deed in trust for co-owners. A is not a party to the agreement, but it is specified therein that he shall have a two-twentieths interest in said mining claims, which interest is non-assessable and exempt from all development expenses. B, C and D incorporate, B deeding the eighteen-twentieths to the company and the remaining two-twentieths to A. The object of the company is not only to develop the said claims, but to secure and develop other mining properties also. In order to do this treasury stock in the company is sold, part of the proceeds applied to the development of the original claims and part used to secure new properties. Will the two-twentieths interest of A be valid in any new properties thus secured by funds realized from treasury stock of the company owning the eighteen-twentieths of the first property, it being understood that A has no stock interest in the company, but simply owns the other two-twentieths of the property originally secured?

Indianapolis, Ind., Oct. 8.

No. A does not appear to be in the corporation.

A has a mining claim that would become vacant January 1, 1902. He relocates it and does the required work in December, 1901. Has he a right to do the location work before the claim becomes vacant for 1902, and will it stand law?

Alamo, Or., Oct. 9.

Yes, be has, and it is legal. He didn't need to "relocate" it. Doing the assessment work within the required time was sufficient.

Kindly tell me how many horse power will 200 inches of water develop with 30 feet fall. How do you figure it?

Jackson, Cal., Oct. 4.

The horse power for 1 miners' inch with 30 feet head is (theoretically) .072441. For 200 inches it would be .072441 \times 200 = 14.4882 H. P.

I have a copper property here that I think could be treated profitably by the leaching process or wet extraction. What is a good method?

Copper Mountain, Alaska, Sept. 13.

As in all cases, whatever the metal, so much depends upon individual circumstance and local conditions that little can be said except in the most general way. If your ore lies in a limestone contact there will no doubt be considerable soluble lime in the ore, probably much in the shape of garnet epidotes and similar minerals. The cost of leaching is naturally increased by the presence of these minerals, as they absorb the solvent to a greater degree than the copper itself.

The Coconino Copper Co. at Ryan, Ariz., has a plant reported to be in successful operation. They claim to be saving better than 92% of the copper at a cost to them for mining, hauling, milling and refining of 5 cents per pound of copper. Their ore is in a sandstone formation, but they have to haul their sulphur 170 miles in wagons. If you have iron or copper sulphides at hand you can get the sulphurous acid from them at comparatively small expense by roasting, but if you have to import brimstone to make the sulphurous acid the presence of much lime would be fatal to any acid leaching process. In such case there is the possibility of leaching the ore with ammonia gas. J. W. Neill, Salt Lake City, Utah, has a patented apparatus for leaching limestone ore with ammonia gas. This method, however, presupposes good ore, as the ammonia is somewhat expensive. Neill & Burfeind, Salt Lake City, Utah; the Santa Rita Copper Co., Santa Rita, N. M., and the Black Warrior Copper Co., Black Warrior, Ariz., are reported to have made a practical success of wet leaching of copper ores.

I would like to get some good formula for the assay of cyanide solutions. Kindly furnish one or two new ones.

Rapid City, South Dakota, Sept. 30.

Several such formulas have appeared herein. What is considered to be a good formula for such work appeared near the bottom of the second column of page 58 of the issue of August 2, 1902. Herewith are appended two other ways collated from Gaze's "Practical Cyanide Operations":

(a) Mercuric Chloride Test.—1. Prepare a solution of mercuric chloride in water 100 grains to 1 ounce; keep in glass stoppered bottle. 2. Take 8 ounces or 10 ounces of solution to be tested accurately measured. 3. From a burette run in mercuric chloride solution to excess, i. e., until a drop of mercuric solution produces no further precipitate. 4. Filter, wash the precipitate, dry. 5. Flux with same fluxes as for evaporation test in a small crucible in the muffle, pour. 6. Detach lead button; cupel in hot cupel. 7. Weigh fine bullion, part; weigh gold, and calculate 8-ounce or 10-ounce assay table, according as 8 ounces or 10 ounces were used.

(b) Zinc Dust Method.—1. Carefully measure 8 ounces or 10 ounces of the solution to be tested; to this add 20 drops of bicarbonate solution. 2. Run in

strong nitrate of silver solution until the deep red color of chromate of silver appears; this shows the consumption of all cyanide and precipitation of gold and silver as argentic auric cyanide. 3. Add 100 grains of zinc dust, mix thoroughly. 4. Add sufficient H_2SO_4 to dissolve all the zinc, when all evolution of hydrogen has ceased. 5. Filter, wash the precipitate, dry. 6. Wrap the precipitate in lead foil; place in hot scorifier, melt, pour; place in cupel. 7. Dissolve all silver out with HNO_3 ; weigh and calculate the gold.

I own a one-third interest in a mining property that is fairly productive and want to know if I can be froze out against my will. Can my mining partners break up the partnership and have the property disposed of?

Los Angeles, Cal., Oct. 5.

This is a hard question, being one of law as well as one of fact. Our inquirer doesn't tell us enough. However, probably if he went into details the matter would require the opinion of a first-class mining lawyer.

In the first place there is considerable difference between an ordinary business partnership and a "mining partnership." Under the assumption that the mining property is in California, it is to be noted that under the California Civil Code (section 2511) a mining partnership exists when two or more persons who own or acquire a mining claim for the purpose of working it and extracting the mineral therefrom actually engage in working the same. An express agreement to become partners or to share the profits and losses of mining is not necessary to the formation or existence of a mining partnership. The relation arises from the ownership of shares or interests in the mine and work of the same for the purpose of extracting minerals there.

Section 2516 of the California Civil Code says that one of the partners in a mining partnership may convey his interest in the mine and business without dissolving the partnership. The purchaser, from the date of his purchase, becomes a member of the partnership.

Just what the trouble is in this particular case is not stated by our Los Angeles inquirer. The law presupposes a remedy for any wrong, but the nature of the "mining partnership," as set forth, appears to make it possible to have any one "butt in" as a "partner," if he can buy a share in the property, and if he or any of the dissatisfied "partners" for any reason want to make trouble the Civil Code seems to give plenty opportunity. In the case of Fisher vs. Superior Court, vol. 98, page 67, Cal. Reports, the Supreme Court of the State of California decided that a court of equity had the power to appoint a receiver of the property of a mining partnership because it was alleged that the property was the property of an alleged mining partnership, and because one of the partners had obtained advantage over his co-owners (and partners) in the purchase of interests, and those partners might bring a suit to dissolve the partnership and ask for an accounting and an order for the sale of the property. A case of somewhat similar import is reported in Grant Co., Oregon, mining news, in the department of Mining Summary, on page 228 of this issue.

This answer is not intended to be other than suggestive, and our inquirer would do well, if the matter is of much financial importance, to get good legal advice, and be governed accordingly.

Does the temperature of the water used have any effect on gold amalgamation? If it does, which is the better—hot or cold water? Are there any records of experiments or proof in that direction?

Rapid City, S. D., Oct. 10.

Considerable has been published in this paper from practical mill men going to show that the temperature of the battery water has much to do with gold amalgamation and that warm water tended to produce better effects than cold.

One mill man, writing from Baker City, Or., gives in detail the results of experimentation in that direction. The water used at Baker City came from the mine at a temperature of 120°, and by the time it reached the batteries was not less than 90°, so that the test was compulsory and comparison was not possible. It was observed in this case that there was an unusually close saving for pyritic ores. The ore milled from \$10 to \$25 per ton, the average for the year being about \$12. The tailings assayed from 40 cents to \$1 per ton, very seldom exceeding the latter figure, and then only when unusually rich ore was milled. The average assay of the tailings did not exceed 60 cents per ton, showing a saving of 95%—a very good showing considering that the ore carried a fair percentage of iron pyrites. As high as 90% of the gold saved was found in the batteries, and much less mercury to the ounce of gold was fed than with cold water. Similar results were obtained on the vanners used for concentration.

In another mill in Oregon a saving of 90% was effected with water at 80°, as against a saving of 80% with the water at 60°, while the concentration was greatly improved by the use of the warm water. This experiment was a good test of the relative merits of warm and cold water, as the water could be readily changed from ice cold to hot.

Another writer on that subject mentions a mill in Australia in which warm water was used with a less

loss of mercury than in a neighboring mill in which water of the ordinary temperature was used. This, however, was attributed to the time used to take up the grease in the water condensed from the exhaust steam of the engine, which was allowed to mingle with the battery water. Placer miners sometimes find that their gold will not amalgamate in cold weather. The placer miners in the Snake river have noticed the same thing and use hurlaps in winter and amalgamated plates in summer.

We are working in quartz loose on the surface, containing about \$7 gold per ton, and are running it through a No. 2 Gates crusher, and from there into a 5-stamp mill, grinding it out to a forty-mesh and trying to get the values by free milling. We have a copper plate in the mortar in back, front and ends or sides, all well coated with quicksilver; outside we have a drip plate, lip plate, about 5 feet of apron plate, all plates except the small end or side plate being silver plated. We started up about two weeks ago and were doing well for the first two or three days. The amalgam was forming nicely on the plates, but we met with the misfortune of getting our front plate (inside) broken loose, and, before we knew it, it was all broken up and parts of it pulverized by the stamps. We put in a new plate at once and cleaned out the mortar; but, on going to work again, our plates all became brassy in appearance, at first gradually getting darker and forming a coating on the plates, the amalgam becoming dissolved and carried away. What I want to know is, How can I remedy the trouble? I have cleaned the plates several times with a weak solution of cyanide of potassium, also with a little sulphate of iron added, but the trouble continues.

Copperas Cove, Texas, Oct. 1.

It seems to be a fact that for two weeks after the start of a new mill the gold amalgamated readily and all the plates kept bright. It is stated that after the destruction of the front chuck block the mortar was thoroughly cleaned out, and it is to be supposed this pulp was not refed into the battery. Pieces of copper will not tarnish silvered plates, or the caps from the blasting, rivets, etc., would keep any mill in poor shape. The tarnishing brassy at first and growing darker indicates grease. If no retaining drip pans are put under dropping grease, which thus mixes with the ore in the feed bin, and if no canvas or other protection is placed under the cams to catch the drip from going directly into self-feeder or mortar throat, or no cleanliness is exercised in wiping off stems or other greasy places, such trouble will ensue. It were also well to examine the feed water and tank and all other sources where contamination could occur after two weeks' running. Tellurium and selenium give dark stains very rapidly; manganese will prevent the amalgam forming, or some trivial cause easily remedied. However, as these should have shown during the first two weeks, possibly lack of cleanliness and presence of grease is the cause. If a journal has been beaten, so as to get babbitt metal or solder in the mortar, the plates would become coal black and slimy.

What is the best method of assaying gold for coining purposes? If practicable, give the technical way. Are there any short cuts in that kind of work? How is the matter regulated for the estimation of metallic gold? Please give formula for calorimetric estimation of gold, likewise in dilute solution.

Golden, Colo., Oct. 1.

The technical assay of gold for coining purposes is invariably performed by cupellation. Tetrachloride of gold is largely used. To ascertain the strength of a solution of the chloride, or its value: If to a solution of gold in the form of chloride (free from nitric acid and the free hydrochloric acid nearly neutralized by ammonia) an excess of oxalic acid be added, in the course of from eighteen to twenty-four hours all the gold will be precipitated in the metallic form, while the corresponding quantity of oxalic acid has been dissipated in the form of carbonic acid. If, therefore, the quantity of oxalic acid originally be known, and the excess, after complete precipitation of the gold, be found by permanganate, the amount of gold will be obtained. A more rapid method consists in boiling the neutral gold solution with an excess of standard solution of potassium oxalate containing 8.3 grams of the pure salt per liter, and titrating back with a permanganate solution which has the same working strength as the oxalate. Each cubic centimeter of oxalate solution represents 0.00655 gram Au. The estimation of small proportions of gold in solution can be done by iodine and thiosulphate, as shown by Petersen. The method has been verified by Gooch and Morley. These chemists found that the reduction of the auric salt with the consequent liberation of iodine was somewhat influenced by the volume of the solution, the amount of iodine present and the time of action. Their experiments showed that the best effects were obtained in a solution of pure gold chloride of about 0.8 gram of the salt to the liter by using 0.1 gram KI to volumes of the chloride ranging between 25 and 50 cubic centimeters. The iodine and thiosulphate solutions used were about $\frac{N}{100}$ strength, verified against each other. The solution of KI contained 10 grams per liter. Process: The gold solution is measured from a burette and the potassium iodide added in the proportions above mentioned. There must always be enough of this to more than redissolve the aurous iodide precipitated at first. A clear solution of starch is then added,

and the blue color produced by it is just removed by thiosulphate. The standard iodine is then added until the liquid assumes a faint rose color and the amount of gold is obtained. Of course, the gold value of the standard solutions must be known by experiments upon a known strength of pure gold solution. For very small quantities of gold $\frac{N}{1000}$ solutions of iodine

and thiosulphate may be used with good effect, but in this case a correction of 0.1 cubic centimeter for the iodine must be allowed for volumes not exceeding 30 cubic centimeters of gold, because that is the amount required to bring out the rose color in a blank experiment. In the practical use of this process for the estimation of metallic gold the metal can be got into solution by chlorine water or aqua regia, but in the removal of the excess of the oxidizer by evaporation it is difficult to prevent the formation of aurous chloride. By adding ammonia in excess to the solution, boiling gently, acidifying with HCl, and heating, if necessary, to redissolve the precipitate by ammonia, again treating with ammonia and heating, and once more acidifying, the ammonium chloride so formed apparently acts in holding up a clear solution ready for titration.

For a colorimetric estimation of gold in ores: Place 100 grams of the ore (or less if more than a trace of gold), and heat it in a stoppered bottle for some hours with 10 cubic centimeters of bromine and 100 cubic centimeters of water. Then filter off the liquid and wash the residue several times with water. Evaporate the filtrate till it no longer smells of bromine. Make it up to 100 cubic centimeters and raise it to boiling. Place $\frac{1}{2}$ cubic centimeter of a fresh saturated solution of stannous chloride in a beaker and rapidly pour upon it the boiling extract. A precipitate will form and sink to the bottom. If no gold be present the precipitate has a slight bluish tint. Gold causes it to be purplish red to blackish purple, according to the quantity of gold present. The gold is estimated by taking small quantities of standard gold solution, making up to 100 cubic centimeters, boiling and pouring into stannous chloride, exactly as was done with the ore extract. In this way the gold can be approximately estimated. The gold present should be between 0.0001 and 0.00002 gram. If there be more than 0.0001 gram a more dilute extract of ore should be prepared. If less than 0.00002 gram be present a larger quantity of ore should be used. Estimation of gold in dilute solutions: Gold may be estimated by the above process in solutions which may contain as little as one part by weight of gold to 5,000,000 parts of water. The following table gives the volumes of solution which must be used according to the quantity of gold present: Gold per liter of water, $\frac{1}{2}$ milligram, volume to be used 100 cubic centimeters; $\frac{1}{10}$ milligram, 500 cubic centimeters; $\frac{1}{100}$ milligram, 1000 cubic centimeters; $\frac{1}{1000}$ milligram, 3000 cubic centimeters. The proper volume of solution is raised to boiling and poured upon 10 centimeters of a saturated solution of stannous chloride. The gold is estimated by taking small quantities of standard gold solution, making up to the same volume with boiling water and pouring into 10 centimeters of the same stannous chloride. For stronger gold solutions the following process may be used: To the solution of gold chloride add some drops of arsenic acid solution, then after a time two or three drops of dilute ferric chloride and some hydrochloric acid. If the liquid be too acid the reaction fails and only a faint blue color is seen; if not acid at all a flocculent precipitate results. Make up to 100 centimeters, add a pinch of zinc dust and shake. A coloration is produced from rose to purple. Limits 0.001-0.0001 gram.

Of what is the fine filament of an incandescent electric light made? How are these filaments made ready for use?

Tuolumne, Cal., Sept. 26.

To form the filaments a solution of cellulose is squirted through dies, emerging in the form of fine threads, which, when dried, are tough and flexible. After being formed into the shapes desired for use in the lamps, the threads of cellulose are packed in crucibles with carbon dust and subjected to intense heat for many hours, which completely chars the cellulose and leaves only the carbon skeleton of each thread. The filament is next suspended in an atmosphere of hydrocarbon vapor, at a pressure reduced below that of the atmosphere, by means of an air pump. There is passed through the filament for a half second a current of electricity strong enough to make it incandescent. The hydrocarbon vapor is thus decomposed, carbon in a form resembling graphite being deposited on the filament. Before treating, all filaments vary in diameter. At points of smaller diameter the resistance is greater, and more heat is generated than at other parts of the filament. These points, being at a higher temperature, would disintegrate and break long before the rest of the carbon had served its useful life. During the process of treatment these hotter portions decompose the vapor more rapidly than the rest of the filament does, and in this manner they are built up by deposited carbon. The result of this process is that the thread now possesses a uniform structure.

As oxygen in any quantity is a supporter of combustion, it is necessary that the carbon filament be burned in a vacuum that its life may be as long as

possible. Accordingly it is necessary to exhaust all the air from the bulb of the lamp, and to conduct the electric current through the glass by means of an air-tight joint. This can be satisfactorily accomplished by the use of platinum, to which fused glass adheres very firmly, and which has the peculiar characteristic that in cooling it contracts at the same rate as the cooling glass. Many other metals and compositions have been experimented with, but it has been found that the different rates with which the glass and metal contracted either caused the glass to crack or would leave a minute space between the platinum and the glass, which would allow the entrance of sufficient current to very quickly deteriorate the service of the filament. Platinum being a very expensive metal, it is desirable to use as little as possible. Hence short pieces of platinum wire are fused to the ends of longer copper wires. Two of these platinum tips are then fused or sealed into the end of a bit of glass tubing having a flange spun on one end, from which the copper wires are left protruding. This combination is now called the mount or stem. A nickel wire is fastened into the fused end of the glass tube between the platinum wires in mounts which are intended for loop filaments. This nickel wire serves as an anchor to prevent excessive vibration and consequent breakage, as well as drooping of the carbon when placed in a horizontal position. The glass is now plastic and firmly amalgamated with the platinum leading-in wires. The filament is next fastened to the mount by means of a special composition which will stand a red heat, and which will give off no gases when the lamp is burning. Over this paste is deposited a layer of carbon similar to the carbon deposited during the treatment of the filament. In this case the filament is locally heated at the point of union with the platinum in a bath of liquid hydrocarbon. This deposited carbon ensures a joint that is both mechanically and electrically perfect. The filament is now anchored, except in lamps having short, stiff carbons requiring support. The anchoring is accomplished by bending the end of the nickel wire into a small hook and placing in this the loop of the filament, holding the latter in place by means of a drop of the composition already referred to. The mount is then placed in an oven to dry the paste thoroughly. The filament is straightened by bending the platinum leading-in wire and the anchoring wire then sealed into the bulb.

Could I use the current from an electric light and power plant for setting off shots? If so, what would be the best arrangement for the connecting wires, etc.?

Delta, Idaho, Oct. 3.

No instance of such use comes immediately to mind in writing, but a similar question to this paper was thus answered a few months ago:

"In mines where there is a source of electricity always available for lighting, power, etc., current can be taken off the mains for shot-firing purposes. This is a simple and convenient plan and can be used especially in shaft sinking. Caution requires, however, to be exercised or accidents may occur, chiefly because the electric current is a continuous one and there is always, therefore, the risk that, owing to some leakage, a current may be generated in the firing circuit and because the current strength is usually greatly in excess of what is required for shot-firing. The conducting cables should be well insulated and should never be connected to the wires of the fuses until all is ready for firing the shot. It is, moreover, best not to trust to an ordinary simple firing circuit, but to use a bi-polar switch, which insures that neither of the cables of the firing circuit is in electrical connection with the mains until the shot firer throws the switching, when both cables are simultaneously connected with the terminals from the mains."

I have heard charcoal recommended in place of zinc in cyaniding. Has it any advantage over zinc, and in what general way? Is it cheaper?

Telluride, Colo., Oct. 5.

That depends on what one would call "cheap." In some cases it is. The question, like all general ones in ore treatment, is not susceptible of direct or detailed reply. Whether charcoal has any "advantage" over zinc is a local issue. In ordinary mill work the charcoal consumes considerable cyanide. There are instances (where cyaniding is the right kind of ore treatment) where an extremely dilute solution is sufficient, or in the case of tailings that consume a good deal of cyanide, in which charcoal is of advantage. Cyaniders instance cases where charcoal has precipitated 94% of solution values. It is fairly credited with ability to precipitate from an acid or an alkaline solution. Any cyanide solution above .8% would not be susceptible of economical use of cyanide in connection with charcoal. Considerable charcoal is required whenever used, 200 pounds charcoal precipitating 10 ounces hullion, which would require considerable extracting capacity. Charcoal has its advantages; little refining of hullion is necessary, no treatment for acid, and little smelting required. When saturated with gold the charcoal can be burned in a special furnace with a down draft into a dust chamber, or, in a large muffle furnace. It is easily made and generally procurable. Experiment and experience can alone determine its relative economy in any individual case.

Mine Signalling by Compressed Air.*

By BERNARD MACDONALD and WM. THOMPSON, Rossland, B. C.

In signalling from the mine workings to the engineer running the hoisting engine on the surface, the system in general use is known as the pull bell system. The mechanical appliances used consist of a marine gong or other sounding apparatus, called the bell, a rope, called the signal rope, a device for deflecting the direction of the signal rope, called the bell crank, and a counterbalance for the weight of the signal rope, called the balance bob. The bell is located in the engineer's room, or within earshot, and generally within convenient sight of the engineer. The signal rope is attached to the bell and carried to the collar of the shaft, thence down it to the deepest workings from which it is desired to transmit signals to the engineer at the surface. The bell crank is a triangular lever, placed at the collar of the shaft, or at any other place, where the direction of the signal rope is changed. The balance bob is placed at the collar of the shaft, or at suitable distances apart in it, to balance or slightly overbalance the weight of the signal rope. It is fulcrumed as a beam, the signal rope being attached to one arm, while the other arm is weighed as mentioned. Balance bobs are sometimes substituted by spiral or coiled springs to produce the same effect. The signals for hoisting or lowering men or material, or telling what is wanted by the workmen below are given by the bell, in the form of strokes and pauses in singles or in any alternating series or combinations conformable with the code used.

The signals are transmitted from any level in the mine by pulling the signal rope, as the signal code requires. The arms of the bell crank, to the ends of which the signal rope is fastened, extend outwards from a fulcrum pivot at right angles to each other. In the case of an incline shaft the arms of the bell crank radiate from the fulcrum pivot at an angle to each other equal to the angle the dip of the incline shaft makes with the horizon. A convenient combination bell crank and balance bob is often made in one piece. The balance bob and the bell crank extend as little as necessary into the shaft, and are boxed in as securely as the conditions will admit, in order to prevent accident in case of pieces becoming loose and falling down the shaft. The signal rope is preferably a wire one, but plaited cotton or hemp rope is of common use. Twisted rope is not suitable on account of the alternate stretching and shortening that would result from the pulls necessary to transmit the signals. The signal rope is kept from sagging or swinging into the shaft by staples or other fastenings driven into the timbers in the corner of the shaft. The balance bobs are so weighted as to overbalance by ten or fifteen pounds the dead weight of the signal rope. Overbalanced thus, unless interfered with by some other causes, the signal rope returns promptly after each pull to its normal position in a state of rest. This device facilitates and makes possible the transmission of signal strokes to the bell at the surface from the workings of the mine.

Separate installations similar to that described are made for each shaft compartment through which hoisting is to be done, and to avoid confusion to the engineer, or mistakes, the gongs or sounding apparatus on the surface have different tones, and are frequently placed at considerable distances apart, and toned in this way the engineer is less likely to mistake from which compartment the signal was transmitted.

When the mine workings are shallow and there is but one or two hoisting compartments, the pull bell system of signalling works very well, but when any considerable depth is attained or where there is more than one hoisting compartment and the traffic is heavy and from various levels, the defects of the system become apparent.

The primary cause of most of the defects is the fact that all the parts of the apparatus are moving parts, having to reciprocate to each other for every pull given by the signal sender. It will be readily understood how an apparatus constructed with a large number of reciprocating parts extending through vertical or inclined shafts to depths of over 1000 or 2000 feet may become deranged and out of order.

One of the greatest defects of the system is that the signal sender cannot know whether the signal he sent to the engineer has been properly transmitted and reported by the bell, as the bell strokes cannot be heard at any considerable depth in the mine. Then, at any time one or more of the numerous parts of the apparatus may become deranged and cease to work during the transmission of a signal, and the part of the signal sent before the derangement occurred may, in itself be a complete signal, conveying to the engineer an entirely different signal from that which was intended. If the erroneous signal thus received be acted upon by the engineer, an accident to life or machinery might result.

Again, the apparatus might become deranged by expansion or contraction of the signal rope. In the case of a wire rope this might result suddenly from the rise or fall of temperature in the shaft due to

change of air currents in the shaft from an upcast to a downcast, or vice versa. In the case of a cotton or hemp rope, the alternate wetting and drying, not uncommon in shafts, would have the same effect. The devices for fastening the balance bobs or for retaining the signal rope in one corner of the shaft are liable to become broken or destroyed by wear or accident, and the rope sag or swing into the shaft, where it would be likely to be caught and carried away by the ascending or descending cages. The numerous defects to the pull bell system of signalling mentioned become more accentuated when the system is operated through an incline shaft.

On account of these defects, a number of electric signalling systems have been devised, from time to time, and tested. While some of these have shown considerable merit, in certain ways, over the pull bell system, nearly all of them demand the use of apparatus too delicate for the rough usage and conditions inseparable from mining operations. These reasons and the lack of simplicity of construction which permits of extension, maintenance and repairs of the apparatus by men lacking technical training constitutes a serious defect in the otherwise best of electric systems.

The defects of the pull bell system became painfully apparent to the writers when they undertook the installation of a signalling system in each of the four hoisting compartments of the Le Roi combination (incline) shaft. If the pull bell or electric systems were installed, the four bells representing the four compartments would have to be in the room with the two hoisting engines. With the possibility of four bells ringing at once, confusion and mistakes would be inevitable. In devising ways to overcome this difficulty, it occurred to us that since the signalling between the conductor and engineer of express trains is now carried on most satisfactorily by compressed air, it would not be more difficult to obtain equally good signal service by the same system through the combination shaft.

With this object in view, correspondence was opened with the Westinghouse Air Brake Co., of Philadelphia, the patentees of the air system used on trains. Being informed that the apparatus of that system was obtainable, and of moderate price, it was purchased and installed in two of the compartments of the combination shaft, in the month of February, 1900. The system was a success from the start, and has been in continuous operation ever since, giving perfect satisfaction without any expense for maintenance or repairs. Recognizing its superiority over the pull bell system described, and believing that its adoption where the circumstances are suitable will add another improvement to mining equipment, the following detailed description of the apparatus and its cost are given.

The apparatus of this signalling system is the same as that used by express trains, with some slight modifications in the installation.

The whistle is the sounding device which conveys to the engineer the signal sent from the mine workings. This is located in the engine room, and where signals from more than one source are received each whistle may be tuned or chimed differently from the other, so the engineer may readily distinguish the source from which the signal is sent.

The signal pipe is $\frac{1}{2}$ or $\frac{3}{4}$ inch in diameter, and must be used exclusively for signalling purposes. It connects with the whistle down to the deepest workings in the mine. Signalling apparatus may be fitted in this pipe at any intermediate points desired. In fitting this pipe care must be taken that no leaks exist, for the smallest leak would destroy the working of the system.

The signal valve must be placed at some point in the signal pipe where there is no danger of freezing—close to the hoisting engine would, perhaps, be most suitable.

The reducing valve is inserted in the feed pipe that connects the compressed air mains of the mine with the main signal pipe of the system.

The discharge valve is inserted in the signal pipe in close proximity to the signalling station so the sibilant sounds of the air discharges may be easily heard by the signal sender. The importance of this lies in the fact that the discharge sounds give assurance that the signal has been delivered to the engineer on the surface. A branch pipe should extend to the main signal pipe and a valve set between the discharge valve and main signal pipe, to permit repairs being made to discharge valve at any time.

A moderately light cord should be attached to the discharge valve at the lever, and extended to within easy reach of the operator.

With each pull of the cord a lever pushes open a valve permitting a small quantity of air to escape from the signal pipe, and causing the signal to be transmitted to the engineer in the manner described.

The apparatus required in the engine room consists of:

One small whistle, cost.....	\$1 25
One reducing valve, cost.....	4 50
One signal valve, cost.....	6 00

Total cost.....\$11 75

The entire cost of installation to a depth of 1000 feet, with signalling stations 100 feet apart, would be \$127.50, made up of details as follows:

Engine room part of apparatus, as above.....	\$11 75
Sufficient $\frac{1}{2}$ -inch pipe to connect from engine room to collar of shaft—say 200 feet.....	5 00
Labor installing (one day, fitter and helper).....	6 50
Eleven discharge valves, located one at collar and one at each working station, cost each \$2.....	22 00
Eleven $\frac{1}{2}$ -inch common globe valves, 75 cents each.....	8 25
One thousand feet of $\frac{1}{2}$ -inch common iron pipe.....	50 00
Fifty wrought iron hangers, 5 cents each.....	2 50
Labor installing (one fitter, two helpers—two days).....	19 00
Ten pounds $\frac{1}{2}$ -inch diameter bell cord, at 75 cents.....	2 50

Total cost of equipment ready for service.....\$127 50

Signals are given the engineer from any station or signalling point in the mine workings by a quick, short pull of the signal cord attached to the lever of the discharge valve. Such pulls momentarily reduce the pressure in the main signal pipe and transmit an impulse on the column of air contained therein, the effect of which is to automatically operate the signal valve and discharge a small quantity of air through the whistle, sounding a sharp, clear blast, corresponding to each pull of the cord. Each whistle blast in the engine room is represented by a sharp discharge of air from the discharge valve, which gives to the signal sender the means of accurately checking the signal sent in.

Signal blasts may be given at the rate of two per second—in fact, this rule should be generally observed, as long discharges of air at the signal valve are not only unnecessary, but likely to confuse the engineer.

In case the supply of compressed air is likely to be shut off at any time, this system might be supplemented with the pull bell, or some of the electric systems of signalling.

In the apparatus for signalling by compressed air there is only one moving part, viz., the lever of discharge valve, whereas in the pull bell system all the parts are of necessity moving parts, being obliged to reciprocate at every pull of the signal rope given by the signal sender. The advantage lies obviously with the apparatus having the least number of moving parts, as every moving part is subject to wear and disorder, which is costly to maintain and repair, and unreliable in operation.

Another very important advantage with the compressed air system is the fact that the signal sender has always the means of knowing whether the signal sent by him has been delivered to the engineer. Changes of temperature, likely to occur from change of air currents, do not effect the working of the system. If any accident should injure the signal pipe or any other of the apparatus of the system, warning would be given at once to the engineer, so the injury could be rectified at once.

In the matter of costs for maintenance, the compressed air system has undoubted advantage of any other system. The system has been established and in operation for about seventeen months at the Le Roi mine, and during this time has required no repairs whatever.

A New Way to Get Levels.

E. Jeyeux, a surveyor at Sevrès, has a new system for obtaining levels, based on two well-known phenomena, the perfect horizontality of the surface of a liquid in repose and the equality of the angles of incidence and reflection of a luminous ray which meets a uniform surface.

The level is composed of a basin C, made of gutta



Illustrating the Jeyeux System.

percha or blackened wood, 20 or 25 centimeters in length by 8 in width, and 4 or 5 millimeters in depth, hollowed as is indicated in the cross section T. This basin is placed on any support about 1½ meters from the ground, and a divided rule R is used on which moves a slide vane with two sights A and B fixed to the ends of a rod which has in the middle a line M. This line should be exactly at an equal distance from the fiducial lines placed on the sights.

The basin having been suitably placed and filled with water to the edge now constitutes a perfectly horizontal mirror, and if the operator directs the basin lengthwise toward the rod with the slide vane, which rod is held vertically, he perceives at one and the same time one-half of the sight B and the image A-1 of the opposite half of the sight A. By raising or lowering the slide vane according as the image appears above or below the sight B the operator

quickly places the vane au point, that is to say, brings the image and the sight B to exactly the same height, so that the fiducial lines appear as the prolongation of each other. By looking with both eyes the surveyor should see both lines clearly superimposed, forming but one straight horizontal line.

In this particular position it is evident that the line M is in the plane of the mirror; that it is exactly on a level with the water in the basin. It is to be observed that when the slide vane is lowered or raised, this latter being au point, there is produced between the fiducial lines of the image A-1 and of the sight B a deviation double the displacement of the slide vane, and, therefore, an error in observing the fiducial lines only produces for the point M an error one-half as great. When the slide vane is a little distant, in order to carefully observe the fiducial lines and to make sure of the superimposition it is well to employ field glasses, the glasses having the advantage also of clearing the edges of the mirror of the light produced by capillary action.

Klein's Combination Classifier.

The Allis-Chalmers Co. of Chicago are introducing to the notice of the mining and milling public a concentrator—the Klein combination classifier—in which compressed air is used as well as water. Of this appliance they claim that it can be used to size or separate materials crushed as coarse as 6 mm.; that it can be used to size anything finer than 6 mm. to the most minute particles; * * * that by the use of compressed air the amount of water required is reduced to less than half of that ordinarily used for hydraulic classification, and that by such elimination of the slimes they can be handled by machinery specially adapted for that purpose.

They state: "This classifier is not in the experimental stage as its practicability has been fully demonstrated at the plant of the Desloge Cons. Lead Co., Desloge, Mo. This is a 600-ton plant and the classifiers have been in use there for two years; prior to the use of the classifiers the lead product in the concentrates averaged 70%, this has now been increased to 75%, due to the efficient sizing of the Klein classifier. The classifiers are also in use for about one year at the following plants: The Granite Bi-Metallic Cons. M. Co., Philipshurg, Mont.; Butte & Boston Co., Butte, Mont.; the Diamond R. Co., Neihart, Mont. The use of this classifier will dispense with the use of a great many sizing trommels formerly required in a concentrating plant and likewise avoid the loss of time and expense incident to the renewal of coverings, etc. Trommels or other sizing screens will only be required for the material coarser than 6 mm. The results obtained from this classifier are without exception the most perfect for sizing and eliminating of slimes ever accomplished in any device of this nature."

From a descriptive pamphlet issued by the Allis-Chalmers Co. the following is taken:

The classifier is made in three different types to suit the size of the material to be handled, as illustrated herewith:

Fig. 1 shows the type used for classifying coarse size of materials, ranging from 6 mm. down to about 2 mm.

Fig. 2 shows the type used for classifying medium size of materials, ranging from about 3 mm. down to about 1 mm.

Fig. 3 shows the type used for classifying the finer size of materials, ranging from about 1 mm. down to the finest slimes.

The principle of the machine is based upon the separation of all slimes and fines from the larger particles and this is accomplished by the constant agitation developed by the introduction of compressed air. The action of the air has a tendency to form small bubbles which continually rise to the surface, carrying with them the slimes and fine material, which are carried off in the overflow with a minimum quantity of water. The air is introduced through one or more pipes from the bottom of the classifier transversely against the column of water introduced through a pipe near the bottom of the classifier.

The classification is accomplished entirely by the compressed air and the water used is only for the purpose of forcing out, or discharging, the sized product through the opening plates directly opposite and in line with the water supply pipe.

In the classifier for coarse materials, shown in Fig. 1, a spray of compressed air is introduced on an inclination against the water supply to cause an agitation which will prevent the possibility of any fines and slimes being carried through the discharge opening with the classified material by the water supply.

In the classifier for material, ranging between 3 mm. and 1 mm., shown in Fig. 2, a mechanical agitator is used to assist in agitation of the pulp in the upper part of the classifier, thereby reducing the quantity of compressed air necessary.

In the classifier for the finest material, shown in Fig. 3, the construction is the same as in Fig. 2, except that the mechanical agitator is omitted.

The water should be introduced under a pressure of not less than 30 feet. The classifier for coarse

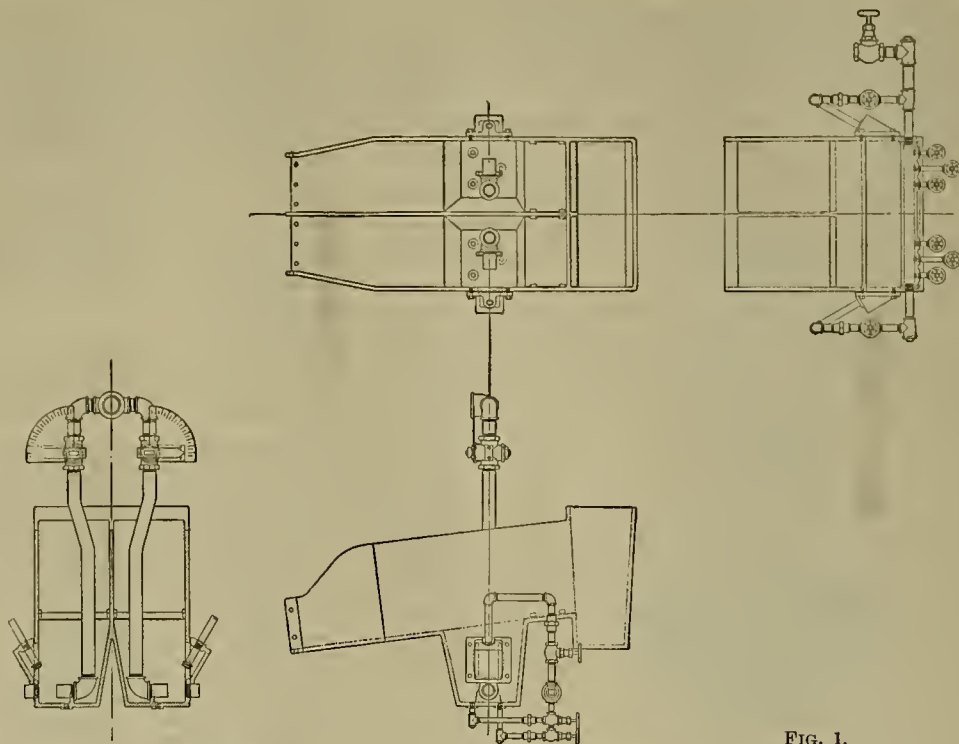


FIG. 1.

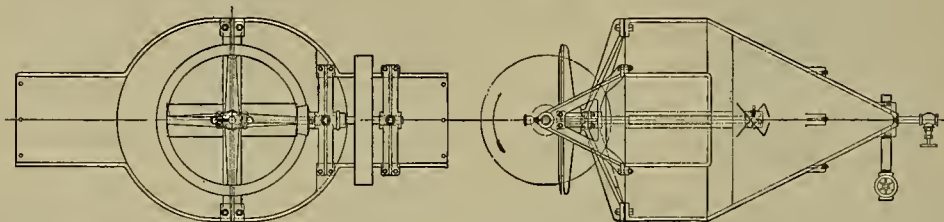
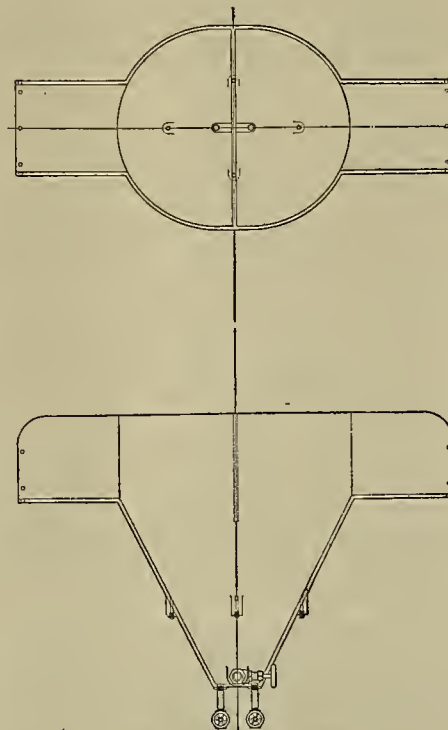
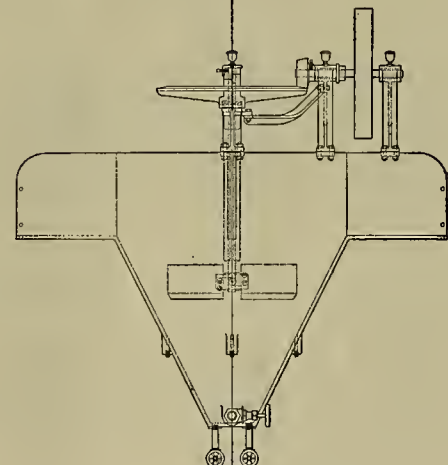


FIG. 2.



Klein's Combination Classifier.

materials requires about fifty gallons of water per minute. The classifiers for the finer materials require about fifteen gallons of water per minute. The compressed air should be used at about thirty pounds pressure; the classifier for coarse materials requires about 40 cubic feet per minute; the classifiers for finer materials require about 10 cubic feet per minute. The capacity of the classifiers depends a great deal on the character of the ore, but for ordinary work the coarser classifier can handle about seventy-five tons per day of twenty-four hours in each compartment, and the classifiers for finer materials can handle about fifty tons in the same time.

The Tomboy Mine, Smuggler, Colo.*

From a Special Correspondent

The new works of the Tomboy Gold Mines, Ltd., in Savage basin, are worth noting. I send herewith three photos, No. 1 a bird's-eye view of Savage

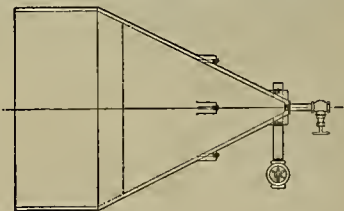


FIG. 3.

basin, which comprises the holdings of the Tomboy Co., Ltd. In the lower lefthand corner is the new 60-stamp mill which is nearing completion. Next above the mill is the new boarding-house, which is also about completed and is a model structure in itself for the accommodation of the men. Just above the boarding-house is the Columbia mill, the property of the Menona M. & M. Co., which is operated by the Tomboy Co. under bond and lease for a certain term of years. On the extreme left are the new stables, timber shed, machine shop and entrance to Cincinnati tunnel, the lower level of the company's works. The farthest up the basin is the old Tomboy mill and tunnel entrance to the Tomboy mine, which was considered worked out until J. Herron, the present manager, took hold of it; under his management it has produced enough to pay for all their property and netted dividends besides. No. 2 is the company's new boarding-house, which will accommodate over 200 men, for sleeping, in connection with large dining-room to accommodate the same number of men at

* See engravings page 215.

one sitting; kitchen and all necessary storerooms connected. The building is constructed in accordance with sanitary requirements, both lavatories and toilets on each floor, steam heat radiation through the entire building.

No. 3 is the new 60-stamp mill, the banner gold mill of the district; modern in every respect, nothing is lacking in the way of economy for proper treatment of the ores. The machinery was furnished by the Allis-Chalmers Co., of Chicago, and erected under the supervision of J. H. Strite. A No. 5 Gates gyratory crusher, style D, is driven by a 50 H. P. Westinghouse, type C, induction motor. A Robins belt conveyor takes the ore from the crusher and delivers it in bin, back of battery, by means of an automatic tripper which travels the entire length of bin, which is 114 feet in length and has storage capacity of over 800 tons of ore. This ore passes then to suspended Challenge automatic feeders to 5-stamp batteries of 1050 pounds each stamp, which make 100 drops per minute, arranged to run in twelve batteries, driven by three 50 H. P. motors—one for each twenty stamps. After the pulp passes over the copper plates, which are 18 feet in length, with one drop in table, it is discharged onto thirty-six Frue vanners, 6 feet in width. The motors of this mill consist of one 5 H. P. for running Robins conveyor, one 10 H. P. motor for clean-up room, three 10 H. P. motors for vanners, three 50 H. P. motors for batteries, one 50 H. P. motor for crusher, two 125 K. W. self-cooling transformers with oil insulation, for transforming 1000 to 200 volts; switchboard made of panelled marble arranged for two main circuits.

The entire plant is lighted by electricity and heated by steam, a system of pipe coils and low-pressure boiler.

The concentrates are conveyed by trolleys from vanner room to dryer, where they are dried and sacked ready for shipment to smelter.

Smuggler, Colo., Oct. 1.

The History of a Catalogue.

NUMBER II.

Written for the MINING AND SCIENTIFIC PRESS by CHAS. H. FITCH.

The education of a person is said to begin generations before he is born, and where there is education there is history. My previous article might have been defined as pre-natal, the ideas and conception of what a catalogue should be in order to satisfy the wish of its maker. What a thing aims to be has a bearing on what it is.

To carry out the purposes of a catalogue, personal credit, trade advertisement and information of customers, we must enlist the arts of paper making, illustration and printing, arts of wonderful expansion, which have within the last few years been making history much faster than the books can record it, history which contributes to that of the catalogue. We have some beautiful catalogues published. And why not? We have toiled, we will say, twenty or thirty years to build up a business. We have a large factory and a long payroll. But there are multitudes of people not on our payroll whose respect we desire. Millions have not seen our factory, large and publicly located though it may be. We will show them. We will, in the publication which goes out to the world to represent us, put our best foot forward and spare no expense. The finest of cuts, the most highly glazed paper, whatever ingenuity can devise for elegant ornamentation, we will put in our catalogue. This elegance does not sell goods, nor inform customers, but it is our show. We do not make it to standard size because we want it to be something extraordinary and stand by itself.

With this work of flourish to show patrons and competitors that we are flourishing I will not greatly concern myself. A Kaffir woman was brought from Natal to this country some years since and shown many displays of which we boast. This girl—Noketula Dube—admired the power and value of much that she saw, but with other things, such as the artificialities of dress and the contentions of religion, she was more puzzled than pleased. What her people needed, she said, was "the useful of civilization."

The "useful" in catalogues comes down to what is the cost of a tidy edition of standard size, and what it does for us in bringing trade, and completing the acquaintance of our customers with our goods. In one function, that of a reference list for the convenience of purchasers, the catalogue holds a place which nothing else can fill, but this is an office utility. That appeals to us more is the usefulness of the catalogue in bringing us new customers.

A standard size catalogue is 6"x9" in size of page. The print usually occupies 4 1/2"x7 1/4". The type is usually long primer or small pica. The illustrations are usually from plates, electrotyped from line engravings or halftones and set type high on wood blocks.

Electrotypes are, like stereotypes, made from the mould of an original cut, the surface being formed by electro-deposition instead of casting. The resulting plates are of copper and are practically facsimiles of the original plates, except that there is a slight

thickening of lines and points. The cost of these plates is not estimated by the square inch, but must be gauged by the electrotypers' scale, which is a diagram of squares, each of which bears a price mark. If we set a rectangular block the size of the picture so that its left corner corresponds with that of the scale, the right upper corner is supposed to come in one of these squares, determining the price, subject to discount. It usually falls on the line between two squares, when the electrotypers give himself the benefit of the doubt, just as the grocer takes the odd half cent in change. The scale is for line cuts on wood blocks. Halftones cost 25% more and metal hacks are extra. On the sizes most likely to be used the cost figures out, say, from 1 1/2 to 3 cents per square inch.

For original plates we have wood cuts, line etchings and halftones. The wood cuts vary in cost with the amount of artistic work upon them. On machinery cuts the range is from 40 cents to \$3 or more per square inch.

The etching processes substitute for the skill of the engraver with his tools the corrosive or dissolving action of an acid. The original of the line etching is usually a pen drawing in black on white paper, made larger than the pictures needed and reduced by photography. This reduction makes a smoother line in the picture. A photographic negative is made in gelatin containing dichromate of potash, which is set or fixed by light, while the surface shaded by lines remains soluble, and, being dissolved away, leaves copper or zinc plates exposed to the etching action of an acid, perchloride of iron being used to etch copper. A substance much in evidence in this work is the brilliant red resinous powder known as dragon's blood. The acid will eat a rough, ragged line if care be not taken, and the brushing of the lines with dragon's blood is necessary to protect and preserve them. Etchings of line drawings upon zinc cost about 5 cents per square inch, with a minimum of about 75 cents for a single cut. Halftones upon copper are made by a similar process, but cost about 20 cents a square inch. The halftone process affords the cheapest means of obtaining plates from a photograph, showing a thing about as it looks. For halftone plate work the negative is obtained through a screen of fine cross lines drawn or photographed upon a transparent film. This is necessary to obtain a printing plate of dots or mechanical stipple on which ink will not blur, but will give to every degree of shade its proper measure.

As an illustration of difference in practice, similar cuts ordered at the same time from American and German photo-engravers were furnished by the American firm in copper halftones, while the plates arriving from Germany were in zinc halftones. The former seemed slightly better, both being used side by side in the same catalogue. Another advantage of the copper appeared when a steam fitting blew out in the vault where the cuts were kept, and the resulting steam bath spoiled some of the zinc cuts through corrosion. The screens used are often too fine, so that the plates do not print well on ordinary paper, and, if electrotyped, fill up and make bad duplicates.

Cuts in the text reduce the cost of composition of type, making what the printers call "phat matter." The paper commonly used is a light grade, supercalendered or enameled, the latter for halftone printing. The weight of paper makes a good deal of difference, both in the publishing cost of an edition and the expense of mailing.

The typesetting or composition and the taking down or distribution of the type are figured to the customer at \$1 to \$3 a page, the former being for "phat matter" and the latter tables, which are more expensive than running text.

About 1898 I got a number of estimates on Mergenthaler machine work, but the prices quoted were higher than for hand composition, even on straight running text, and cuts were not handled.

By electrotyping entire pages in thin shells, which are made type high by being clamped to patent blocks for printing, a great saving of composition can be made on reissues and new editions. A pocket edition can be photographed down from say 6"x9" and zinc etched, page for page, at reduced cost, without setting a line of type.

For the run of 6"x9" catalogue work I used to figure \$1.75 per printed page for composition, and 30 cents per 1000 pages run for paper and printing in one color. For two-color work I figured 60 cents, and electroplates per page were 40 cents. Prices have lately changed through combination, and have stiffened somewhat, except halftone work, which is rather lower on account of competition, reduced cost and extensive use. Electrotyping is now higher, also zinc etching. Still, I think prices are fair, and that combination is beneficial. There was a time when zinc etchings were so cheap that they were not decently done, and persons buying of the lowest bidder got shallow cuts and "print-ups" for their economy.

All these remarks apply to publication on a close, economical basis, of those who, though "on fine art bent," have yet "a frugal mind." My advice is not to be too frugal. If the catalogue is what it ought to be, the ripe fruit of the manufacturing "plant," well considered in purpose and detail, the cost of preparation should so far outweigh cost of publica-

tion that we can afford a little extravagance in the latter. If the catalogue is built upon the lines of a cheap idea it may be cheaply published, but a valuable idea deserves to be well dressed.

Some further particulars of costs with their relation to advertising results will be given in another article.

(TO BE CONTINUED.)

Velocity and Discharge of Water Through Submerged Orifices.

The following table shows the theoretical spouting velocity of water in feet per second, and number of cubic feet discharged per minute, through an orifice of 1 inch area, under different heads, from 1 to 40 feet:

Head in Feet.	Velocity per Second in Feet.	Cu. Ft. per Min., Area of Orifice, 1 In.	Head in Feet.	Velocity per Second in Feet.	Cu. Ft. per Min., Area of Orifice, 1 In.
1	8.02	3.34	21	36.75	15.31
2	11.34	4.73	22	37.62	15.66
3	13.89	5.78	23	38.46	16.02
4	16.04	6.68	24	39.29	16.36
5	17.93	7.47	25	40.10	16.71
6	19.64	8.18	26	40.89	17.04
7	21.22	8.84	27	41.67	17.36
8	22.68	9.45	28	42.43	17.68
9	24.06	10.02	29	43.19	17.98
10	25.36	10.57	30	43.93	18.30
11	26.60	11.08	31	44.65	18.60
12	27.78	11.57	32	45.37	18.90
13	28.91	12.05	33	46.07	19.20
14	30.00	12.49	34	46.76	19.48
15	31.06	12.94	35	47.45	19.76
16	32.08	13.36	36	48.12	20.05
17	33.06	13.77	37	48.78	20.23
18	34.02	14.18	38	49.44	20.60
19	34.96	14.57	39	50.08	20.87
20	35.87	14.94	40	50.72	21.12

Calculated from Francis' Formulas.

The above table represents the theoretic velocity and discharge due to an orifice conformed in all respects to the shape of the contracted vein. In ordinary practice, through orifices having parallel sides the actual velocity and discharge will be but about 64% of the table. Bearing this fact in mind, the above table may be used with reasonable accuracy in measuring the discharge of water through ordinary gate openings into overshot and breast wheels, through waste gates, and other apertures cut in planks.

EXAMPLE.—Suppose the opening through which the water passes onto an overshot wheel to be 72 inches long, and the gate to be hoisted 2 inches, what amount of water will it discharge per minute with 3 feet head of water in the forebay above the opening?

SOLUTION.—72 × 2 inches equals 144 square inches × 5.78 (the discharge stated in table for an orifice of 1 inch area under 3 feet head) equal 832 cubic feet theoretic discharge per minute, 64% of which equals 532 cubic feet actual discharge per minute.

There are many instances in powers already improved where the quantity of water in a stream can be ascertained by using the above table, without resorting to measurement by weir.

In ascertaining the head of water under which an orifice is discharging, measure from the surface of the water to the center of the orifice.

Recent Coal Labor Statistics.

The volume of mineral resources of the United States for the calendar year 1901, now in press, U. S. Geological Survey, presents some interesting statistics of the labor in the coal mines of the country.

From 1898 to 1901, inclusive, the statistics of coal production were as follows: In 1898 the average number of men employed was 401,221, and they averaged 190 working days during the year, producing 219,974,667 short tons of coal, valued at \$208,000,850; in 1899, 410,365 men, working 214 days, produced 253,739,992 short tons, valued at \$256,077,434; in 1900, 448,581 men, working 212 days, produced 269,682,827 short tons, valued at \$306,671,364; in 1901, 485,544 men, working 216 days, produced 293,298,516 short tons, valued at \$348,910,469. In 1898 the average price of coal per ton was 95 cents; in 1899 it was \$1.01; in 1900 it was \$1.14; in 1901 it was \$1.19.

According to the two great divisions of the coal industry—the bituminous and the anthracite—the statistics are as follows: In the bituminous coal industry in 1890 192,204 men, working 226 days, produced 111,302,322 short tons, valued at \$110,420,801, an average of 2.56 tons per man per day and of 579 tons per man per year; in 1895, 239,962 men, working 194 days, produced 135,118,193 short tons, valued at \$115,779,771, an average of 2.90 tons per man per day and of 563 tons per man per year; in 1900, 304,375 men, in 234 days, produced 212,314,912 short tons, valued at \$220,913,513, or 2.98 tons per man per day and 697 tons per year; in 1901, 340,235 men, working 225 days, produced 225,826,849 short tons, valued at \$236,406,449, or 2.94 tons per man per day and 664

tons per year. The average price of bituminous coal per short ton in 1890 was 99 cents; in 1895, 86 cents; in 1900, \$1.04; in 1901, \$1.05.

In the anthracite mines in 1890 the number of miners was 126,000, who in 200 days produced 46,468,641 short tons, valued at \$66,383,772, the average production being 1.85 tons per man per day and 369 tons per man per year; in 1895, 142,917 men produced in 196 days 57,999,337 short tons, valued at \$82,019,272, an average of 2.07 short tons per man per day and of 406 tons per man per year; in 1900, 144,206 men working 166 days produced 57,367,915 short tons, valued at \$85,757,851, or 2.40 short tons per man per day and 398 tons per man per year; in 1901, 145,309 men worked 196 days and produced 67,471,667 short tons, valued at \$112,504,020, an average production of 2.36 short tons per man per day and of 464 tons per man per year. The average price per short ton of anthracite coal in 1890 was \$1.43; in 1895 it was \$1.41; in 1900 it was \$1.49, and in 1901 it was \$1.67.

In the last twelve years the number of workers in the anthracite mines has increased from 126,000 in 1890 to 145,309 in 1901, or over 15%. During the same period the number of men in the bituminous mines has increased from 192,204 to 340,235, or a little over 77%.

The statistics of accidents in the mines in the calendar year 1901, already published in part, show that 1467 men were killed, 3643 men were injured, and that 188,668 tons of coal were mined for each life lost. In the bituminous mines of the country 954 men were killed and 2400 were injured, in a total of 340,235 men at work; in the anthracite mines 513 men were killed and 1234 were injured in a total of 145,309 at work.

The statistics for Pennsylvania alone show 301 men killed, 656 men injured, and an average of 273,288 short tons of coal mined for each life lost in the bituminous mines; and 513 men killed, 1243 men injured, and an average of 131,524 short tons of coal mined for each life lost in the anthracite mines. It is interesting to note that in Pennsylvania the number of short tons of bituminous coal mined per life lost was a little more than double the number of short tons of coal mined per life lost in the anthracite mines.

Notes on the Treatment of Zinc-Precipitate Obtained in Cyaniding New Zealand Ore.*

By HAMILTON WINGATE, B.Sc., Auckland, N. Z.

In view of the fact that the fineness of the resultant bullion varies with the particular treatment to which the zinc-precipitate is subjected, and since there are considerable losses attributed to both methods, the following notes on the results obtained at the Waite-kauri Extended mine, Maratoto, N. Z., may be of interest.

The ordinary method of roasting the vacuum-dried precipitate was adopted instead of the treatment with sulphuric acid, the necessary facilities for the latter method not being available. Moreover, provided the ordinary method is carried out with the necessary care, it is questionable if it is not the most satisfactory where large quantities of precipitate have to be banded, and where (as is generally the case in this district) a considerable amount of silver is present.

All the precipitate was first washed through a 40-mesh sieve. If it was necessary to recover the bullion at once from the accumulated short zinc, it was oxidized and melted separately; but, as a general rule, being heavily charged with bullion, it was placed on the bottom of the trays at the top end of the extractor boxes, where it acted as an excellent precipitant, the bullion being recovered at the next clean-up.

After drying on a filter with the aid of a vacuum pump, the precipitate was weighed, and removed to the oxidizing furnace, which is similar to that generally in use in New Zealand, consisting essentially of an ordinary square tray of cast iron, with 6-inch sides, built over a brick furnace. Wood is used as fuel. The tray is banded over with sheet iron, fitted with a sliding door, and the fumes pass through a flue at the top into a dust chamber, then into the open air.

OXIDATION OF THE PRECIPITATE.—The oxidation was conducted first at a low temperature, which is gradually raised, until finally the iron tray is a very dull red heat, the precipitate being broken up with a suitable rake, and great care being exercised to avoid loss by dusting, especially as the last stage is reached. After cooling, the precipitate was carefully weighed, the time occupied in oxidizing being from two to four hours.

MELTING OF THE OXIDIZED PRECIPITATE.—The oxidized precipitate was fluxed as follows: 100 parts of oxidized precipitate; 50 parts of anhydrous borax; 15 parts of anhydrous sodic carbonate; and, after mixing, carefully charged into a No. 50 plumbago crucible, and melted at a moderate heat, the pot being kept carefully covered during fusion, and recharged in each case before fusion was complete. When three-quarters full, the temperature was raised, the slag, now thoroughly liquid, was ladled off

into molds, and the crucible recharged as before, until about two-thirds full of molten bullion.

The bullion was now poured into molds, each bar being again melted in a crucible of smaller size, and skimmed, if necessary, before pouring. After washing, the bars were then sampled and weighed.

The following table gives the particulars of eight consecutive clean-ups and the fineness of bullion obtained:

Fineness of Bullion	Sil. Cont. in Bullion.	Fine Gold Contained in Bullion.	Total Weight of Bullion Obtained.	Per Cent Yield of Bullion from Oxidized Precipitate.	Weight of Oxidized Precipitate.	Weight of Vacuum Dried Precipitate.	No. of Melt.
909.0	343.94	115.86	565.8	81.9	56	112	1
914.5	181.46	57.44	261.1	53.0	33.75	65	2
936.1	433.23	110.37	581.75	72.2	55	95	3
956.5	461.28	130.75	622.05	56.7	76.5	130	4
964.2	304.12	84.82	403.35	52.1	53	88	5
961.0	417.82	129.23	569.25	45.1	86.5	150	6
943.5	278.77	92.84	393.85	58.8	43.5	71	7
935.9	263.35	85.29	373.55	41.3	62	122	8
							Total.
			3710.70	54.8	466.25	833	

NOTE.—In the case of Nos. 1, 3, 5 and 7 only the top partitions of the extractor boxes, containing the most of the precipitate, were cleaned out, whilst in the case of Nos. 2, 4, 6 and 8 a complete clean-up of the extractor boxes was made. The bullion was recovered from ore all of which had been wet-crushed.

The fineness of the bullion obtained was mainly due to the passing of the precipitate through the 40-mesh sieve, thus eliminating the "short zinc." It is impossible to oxidize such zinc, scattered throughout a mass of bulky precipitate. Its presence causes both mechanical losses and losses through volatilization, and it is most important that it be either eliminated or oxidized, if subsequent losses in melting are to be avoided.

SAMPLING OF THE BARS.—The bars so obtained were of very uniform composition, and the drillings from a hole right through the bar gave very accurately its actual value. The base metals present were zinc, together with lead, iron and copper in small quantities, the latter being derived most probably from the fulminate caps used in the mine, as no trace could be detected of its presence in the ore.

SLAGS, ETC.—These were crushed in the mill, giving a return equal to 1½% of the total bullion recovered, the tailings, as bagged for shipment to the smelter, being worth, according to careful sampling, £25 per ton. The sweepings from the dust chamber and flue resulted in the recovery of bullion of a total value of £9 after the oxidizing of some £6000 worth of precipitate, showing the loss from this source to have been small.

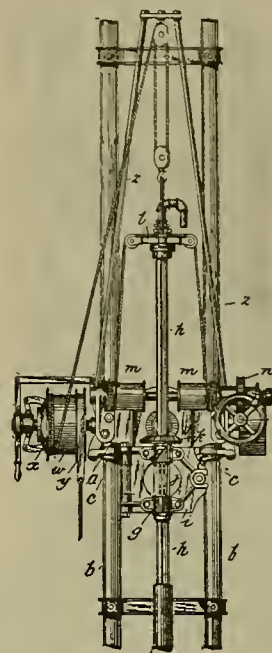
MEN should use the technical papers intelligently. It is a good plan for the head of any department to mark articles and send them to associates and employees for comment and suggestion. If a young engineer or miner or metallurgist is so situated that he can contribute to the technical press as a writer, it will be of distinct advantage to him to do so. He acquires the ability to express himself well; he learns to think straight (or he is quickly found out); he will become known to his future associates. The discussion which may arise on the subject will be at comparatively short range; an experienced writer is given a better chance to consider any reply to questions and criticism than is offered in oral debate at a society meeting; moreover, the men who take part in such discussions do so because they are interested in the subject. And the pecuniary reward is not to be despised. As a preparation for his future work, a young engineer can not do better than to become a close reader of the current periodicals which have for their field his chosen profession. Let him follow the discussions and, if possible, take part in them; in order to do this with credit to himself, he must become familiar with the subject, and, having once mastered it, will easily recognize it when after eight or ten years the same subject may appear again, thinly disguised and heralded as something that is really new. Many matters have a way of reappearing at more or less regular intervals, so that the elders of the profession have met most of them more than once.

Mining and Metallurgical Patents.

Patents Issued October 7, 1902.

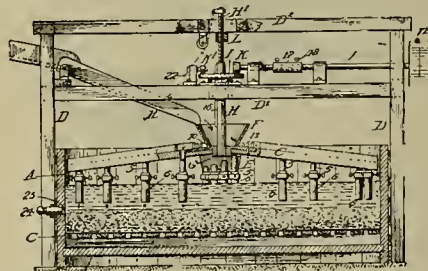
Specially Reported and Illustrated for the MINING AND SCIENTIFIC PRESS.

ROTARY DRILLING MACHINE.—No. 710,438; F. H. Davis and C. A. Terry, New York, N. Y., assignors to Davis Calyx Drill Co., New York, N. Y.



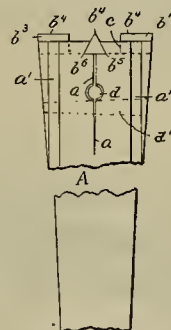
In core-drilling machine, combination with stationary supporting member and drive shaft whose bearings are stationary therewith, of member vertically swiveled upon stationary member, revolvable drill rod, mounted in bearings upon swiveled member, intermediate shaft, gearing between intermediate shaft and drill rod and between intermediate shaft and drive shaft, and through which gearing drill shaft is adapted to be rotated, secondary shaft, worm-wheel on intermediate shaft, worm on secondary shaft, gears adapted to intermesh between drive shaft and secondary shaft, together with means whereby intermediate shaft may be actuated by drive shaft to rotate drill rod, either directly through aforesaid gearing between it and drive shaft, or through worm-gearing, and gearing between it and drive shaft.

SETTLING TANK.—No. 710,462; R. D. Jackson, Reno, Nev.



In settling tank, distributor having downwardly extending discharge outlets for pulp and liquid, means for supplying material to distributor, means for rotating distributor, means for raising distributor while rotating whereby distributor rises steadily above accumulating deposit.

ROCK DRILL, ROCK DRILLING MACHINE BIT.—No. 710,484; D. Mackenzie, Randfontein, South Africa.

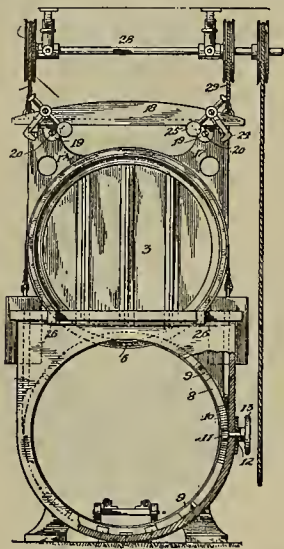


Combination of holder formed with grooves or recesses across end thereof made angular for portion of their entire length to receive removable cutters, having shoulders against which inner ends of cutters abut, holder being also split for portion of its length

*New Haven Meeting, Am. Inst. Min. Eng.

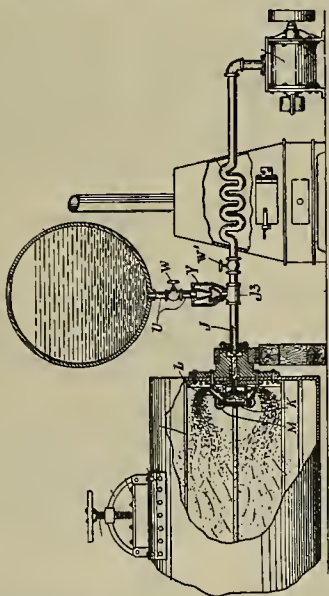
in two directions into jaws which normally grip cutters, but may be expanded, and detachable angular cutters adapted to fit grooves provided with several separate cutting edges so constructed and arranged in holder as to be capable of being removed and replaced to reverse each cutting edge.

CLOSURE FOR RETORTS.—No. 710,476; J. M. K. Letson and F. W. Burpee, Vancouver, B. C.



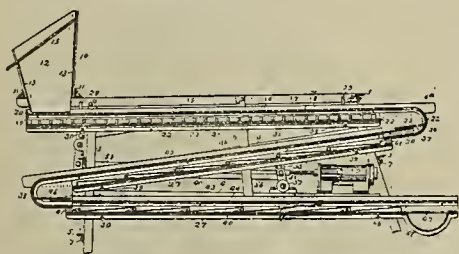
In retort, slotted and internally grooved head having upper seat, door adapted to be seated in groove, cap piece for closing head slot, pins journaled in cap piece having eccentric ends, operating handles, hooks loose on eccentric ends taking beneath lugs when handles are turned in one direction, projections on handles for throwing off hooks when handles are turned in opposite direction and eccentrics are released.

PROCESS OF TREATING ORES.—No. 710,496; S. T. Muffly, Bowdre, Ga.



Saturating ores with chemical solvent, revolving ores and solvent, agitating and breaking up ores, injecting current of heated air under pressure charged with fresh solvent in the form of spray at one point to ore charge, circulating spray through ore charge axially of its revolution and agitation, carrying off liberated elements and fumes at point opposite to injection of spray.

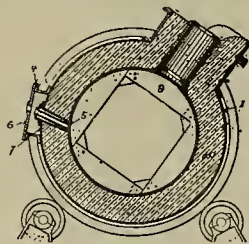
MACHINE FOR SEPARATING GOLD.—No. 710,738; W. J. Barron, Brooklyn, N. Y.



Gold washing machine comprising in combination hopper 14 having inclined grid 15, inclined pan 16 beneath hopper having longitudinal screen 17 supported by ledges 19 in pan, cross-plate 20 at head of pan, riffles 21 in pan below screen, hood 26 at tail of

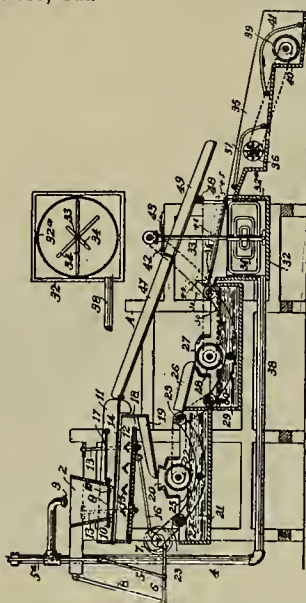
pan, reverse inclined pan 35 having screen 36 extending into hood having amalgamating plates 40 beneath screen.

METHOD OF FORMING LINING OF CONVERTERS OR FURNACES.—No. 710,588; W. J. Knox, Edgewood Park, Pa.



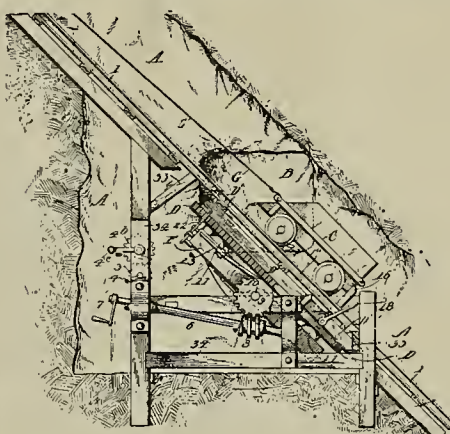
Process of lining vessels for metallurgical work, which consists in forming dry mixture of pulverized magnesite and oxysulphide of iron, adding thereto soluble glass, forming mass into plastic condition by addition of water, applying mass thus formed to surface to be lined, drying same, then applying thereto solution of calcic chloride, thereby forming calcic silicate throughout mass.

GOLD SEPARATOR.—No. 710,690; W. W. M. Hickey, San Francisco, Cal.



The combination in gold separator of inclined suspended end-shaking sluices having perforated inclosed bottom respectively, inverted riffles extending across lower sluice out of contact with bottom, hopper with perforated oscillating bottom located above upper sluice, pumping mechanism, means whereby actuated in unison with oscillations of sluices, plurality of amalgamated rollers journaled turnable with lower portions submerged in water tanks, chutes for delivering material upon tops of rollers, endless traveling belts submerged in tanks receiving material as it falls from rollers, belts discharging material from each tank successively, tank having vertically journaled shaft and stirring arms into which material is delivered, and an inclosure exterior to which water is separated from sand, and a pipe by which clean water is returned to pumping apparatus.

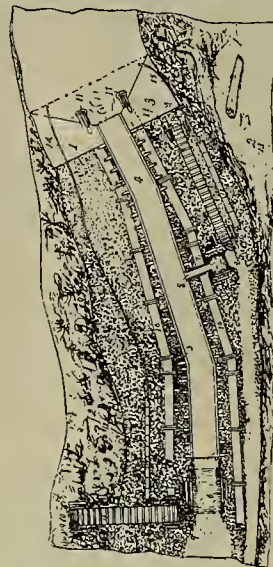
TURNTABLE FOR USE IN MINES.—No. 710,851; W. L. Eppers and J. Hamilton, Mount Washington, Md.



Combination, with inclined mine shaft and lateral level communicating therewith and having tracks of

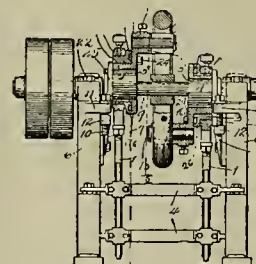
like gauge, of table which is pivoted and adapted to rotate in vertical and horizontal planes provided with track section of same gauge as fixed tracks, worm gearing, two worm shafts for operating same, to rotate table as required to shift it in both planes, shafts being provided with cranks arranged in juxtaposition, and spring pin for locking table and lever connected with pin and extending into juxtaposition with cranks of worm shafts.

APPARATUS FOR EXPOSING BEDS OF WATERCOURSES AND CONVEYING MATERIAL THEREFROM.—No. 710,813; J. W. Stanearth, San Francisco, Cal.



In means for exposing river beds and conveying material therefrom, combination of dam across river, flume extending along and above bed of river discharging into river bed at lower point in its course, flume being of sufficient dimensions to take whole normal flow of river, conveyor for carrying away tailings extending upward in bed of river, and means operated by passage of water in flume for actuating conveyor.

ACTUATING MECHANISM FOR JIGS FOR WASHING MINERALS OR ORES.—No. 710,777; C. J. Hodge, Houghton, Mich.



Combination of frame, continuous shaft rigidly mounted in frame, means for driving shaft, two rigid trunnions adjustably secured to frame near ends of shaft having elongated passages through which shaft passes, eccentric journaled on each trunnion having crank-arm, flywheel fixed to shaft between crank-arms having radial diametrically opposite slots or ways, studs connected to crank-arms sliding in ways and eccentric rods actuated by eccentrics.

QUICKSILVER FURNACE.—No. 710,897; R. Scott, San Jose, Cal.



In combination with tile for quicksilver furnaces or the like, a well, bracket formed of single piece with inner leg adapted to be set in wall of furnace, outer leg formed with apex for supporting tile, preventing its displacement.

FUSE-IGNITING TAPE.—No. 709,979; J. H. Carson, Denver, Colo.

A fuse-igniting tape formed from strip of material coated on its inner surface with an inflammable or explosive substance, its exterior surface with substance adapted to prevent injury from moisture.

Mining Summary.

Specially compiled and reported for the
MINING AND SCIENTIFIC PRESS.

ALASKA.

(Special Correspondence).—Since the ditch line of the Miocene Ditch Co. is completed an entire change has come over Dexter creek. Every claim is working to its fullest capacity and the result is very satisfactory. Snow gulch claims Nos. 1 and 2 are being hydraulicked and the tailings from former years are being worked over. The Utica claim on Glacier creek, owned by Chas. D. Lane, is working a crew of thirty men day and night. The Hot Air bench continues to take out big clean-ups—\$4000 to \$5000 every twenty-four hours. Rock creek, tributary to Snake, has developed quite a few good claims. No. 2 below on Anvil creek has closed down operations for the season. Next season a hydraulic giant will work on the tailings and the banks. The benches of Anvil are proving to be as rich as the creek itself; however, work is not being rushed on them in anticipation of hydraulic plants next season. The foothills of Anvil, Saturday and Coopers' gulch have developed several deep mines, some 60 and 70 feet deep, with pay at bedrock of 5 to 10 feet. Peeluk creek No. 3 is being worked by the present owners, Mathews & Clum, who bought the claims Nos. 3 and 4 for \$40,000 from Dugan & Bell. They have a crew of thirty men employed day and night, and some clean-ups go as high as \$2500 per twenty-four hours' run. The gold is fine, and it is believed the beach has deposited the gold on the high ground. However, No. 5 on Peeluk creek is developing into a good mine also. The gold is much coarser and undoubtedly comes down from the mountains. Otter creek and its tributaries, Fox creek, Franklin gulch and also the benches, are good properties and are being opened up with good results. Nome river will have two new ditches. One will be built from the headwaters of the Nome river and will be 6 feet at the bottom, 10 feet on top and 6 feet deep. The preliminary work has all been done and work will be commenced early next spring. Kelly & Co. have brought in on the Ohio 200 tons of machinery for their pumping plant, which will be installed this year at the mouth of Dexter on Nome river and will pump water into a reservoir on the Dexter hill from which it will be conveyed to Dry, Dexter and Anvil creeks.

Solomon river has a boom of its own. Benches of Solomon are good from Big Hurrah to about 3 miles below Snowell creek. Big Hurrah is working six claims—several big nuggets, one \$140 and the other \$80, having been found on No. 4. Snowell creek benches are proving to be of good value. Mrs. E. McNaught, who owns the Ophir Bow, has discovered a good paystreak at the upper end of her claim while the assessment work has been performed. Mystery creek has contributed at least \$50,000 to the season's output. Also, the benches are being prospected now. Quite a stampede was in progress this summer to Jackson creek and the west fork of Jackson creek across the divide from Mystery, where very good prospects have been found, while some assessment work was being done. Beaver creek, tributary to the El Dorado river, has opened up a few paying claims.

Ophir creek, in the Council river district, has been worked from its head to its influx with the Neukluk and good results have been obtained. C. D. Lane, who owns considerable property there, has developed that section wonderfully. A railroad goes from Council to No. 15 above. A ditch has been built from the head of Ophir to No. 15 and will be continued down to the mouth of the creek.

Candle creek, it is claimed, produced this season \$100,000, in spite of the unfavorable reports that have arrived all summer from that section. The Inmacubuk river, a tributary to the Good Hope bay, has several good claims; the country up in the Arctic district, however, is so waste and so very few men have given it any attention, that it will take several years before it is thoroughly developed. The Koregrock section has had a bad reputation all summer and very little work has been done in that section of the country. Several tin ledges are claimed to have been discovered above Teller in the direction of Potato mountain, but no further news has been heard from it. The Sinrock river has also proven to be very valuable in its vast deposits of auriferous gravels on what is known as Irish hill, on Green gulch, a tributary to Sinrock, where good mines are being developed by Mrs. E. McNaught.

The season is drawing to a close. The nights are commencing to be frosty, and in some parts the mining operations have

ceased for the season. Winter work will commence soon, especially in the neighborhood of Nome, on Peeluk, Otter creek, Newton gulch, Bourbon and Dry creeks, Wonder benches and in the old mines of Dexter and Anvil creeks.

The season has been very satisfactory and next year we hope to go one better.

No discoveries have been made of any placer diggings in Siberia by the Siberian D. Co. and its 200 men up to date. Some quartz has been found but no startling values discovered.

Nome, Oct. 1.

ARIZONA.

COCHISE COUNTY.

Superintendent Quinn, of the Grand Reef mine, with R. V. Day, general manager mining interests of the estate of J. W. Mackay, is at the property of the estate, 60 miles north of Willcox. A smelter will be erected.

W. F. Staunton says the four boilers at Tombstone, the largest in the Territory, are in operation, the steel gallow-frame placed, and the pumps and heavy machinery all lowered into the mine successfully. The pumps will be running Nov. 1. The new buildings are all completed and in use by the company and its employees. The dead work is accomplished and new development will begin. Men are cleaning out the old workings on the 600-foot level and connecting them with the new shaft. When the pumps begin running, sinking in the big shaft will follow. The shaft will be put to the 700-foot level.

J. Blair has charge of a force on the property of the Arizona Development Co., near the property of the Copper Glance. The Peabody mine, near Cochise, which was shut down on account of the low price of copper, has resumed. Ore is being shipped from Cochise station.

The mines at Gleason, Ingram and Pearce have resumed.

At Bisbee, where they have excavated for the new jail, they have run onto numerous kidneys of high-grade copper glance and peacock ore. The Review says that hereafter when a bad man digs out of jail he will be earning good wages while he is digging.

GRAHAM COUNTY.

The Shannon Copper Co., Clifton, has foundations for a 500-ton concentrator. The original intention of the company was a 250-ton mill, but recent developments at the mine justify a larger plant. It is expected to have the first 250-ton section in operation in January.

The London Statist claims to have information that the Arizona Copper Co. is now producing copper at 6.7 cents per pound, including electrolytic, refining and marketing charges.

MARICOPA COUNTY.

At the Electra mine, between Wade's and Gilbert, the shaft is down 200 feet; the ledge has widened over 5 feet, the entire shaft being in ore.

In the Leviathan G. M. Co., which owns and is operating the Maximilian group of claims 16 miles north of Wickenburg, the main shaft is down 300 feet.

The Oro Grande will start the erection of their mill within a short time.

In the San Domingo district, the Maricopa G. Co. has put in three dry concentrators, of 4, 6 and 9 H. P., run by gasoline engine.

A. H. Gamage has returned to Wickenburg and will work the Denver group at Gilbert.

J. M. Swetman has bought the Norman, Great Scott and Scott No. 2 mines and the Wainwright mill site for \$10,000. The property is located 45 miles north of Phoenix.

MOHAVE COUNTY.

A double compartment shaft will be sunk on the Mother Lode, owned by the Philadelphia & Arizona Co.

At Chloride is received a carload of iron ore from Cerrillos, N. M., for the smelter. At the Gold Nugget, Cerbat, Superintendent Barry has men getting ready for extensive work.

At the 500 level of the Minnesota a station has been cut and drifting is under way.

PINAL COUNTY.

Near Florence, work is resumed this week in tunnel No. 1 on the Henry-Ritsch property.

T. J. Seybolt has bonded a group of claims on Queen creek, above the old town of Pinal. The old Gem mine is the leading claim of the group. He will put in air compressors and use machine drills in developing the property.

Supt. F. D. Adams says that the Bob Tail Mines Co. has been reorganized, and the name changed to the Gila-Pinal Mines Co. They will put in extensive machinery at the gold mine on Mineral creek, and at the copper mine in the Pinal mountains, in Gila county, and actively develop and operate both properties.

A. G. Sandberg has given Phelps, Dodge & Co. a working bond on the Ariz-

zona copper group, 30 miles south of Casa Grande. The bondees have men at work on the group and are uncovering ore bodies.

SANTA CRUZ COUNTY.

M. Lulley, a prospector, has found a "lost mine," the "Wandering Jew," at Tumacacori, 6 miles north from Calabasas, 4 miles south from Tubac.

The Pride of the West M. & M. Co., at Washington, is again in operation. Jesse Scooby is general manager.

The Pride of the West M. Co. of Washington paid a dividend of 10 cents per share, \$15,000, August 15.

YAVAPAI COUNTY.

G. W. Hull says Jerome is still very quiet. The fire in the mine is still burning and it will be two months or more before it can be gotten under control. The company, however, is still pushing work in putting in the new smelters, and have 100 men at work in clearing away the debris caused by the floods some weeks since.

A. J. Pickrell of the G. & C. Con. M. & M. Co., President group, is putting up a cyanide plant, to be ready to start up Dec. 1, when fifty tons of ore a day will be treated. The company employs thirty men.

W. D. Powell is putting up machinery on the Black Rock mining claims, Cherry Creek district, and says that he has a body of copper ore in a new shaft sunk in the Ontario. The old shaft followed a ledge in which a large body of rich ore was struck.

The fire in the McCabe mine is extinguished.

YUMA COUNTY.

The Sentinel says that the new Arizona Smelting & Reduction Co., J. Rice president, F. N. Rust secretary, propose building a smelter in the vicinity of Yuma.

Globe reports that at a meeting of Globe merchants action was taken withdrawing patronage of business firms and individuals from the organ of the Globe Miners' Union, the first step in a movement in which the copper companies are included to break the Miners' Union and make Globe a non-union town.

CALIFORNIA.

ALPINE COUNTY.

The Alpine Placer G. M. Co. is organized; E. R. Dodge of Reno, Nev., is secretary.

AMADOR COUNTY.

The Zeila mine will adopt oil for fuel purposes.

A long tunnel has been driven to the Horn boundary line, and connection made with the shaft. The ore body is 7 feet wide, and prospects taken of the rock and decomposed matter indicate a value of \$100 per ton.

A two-stage air compressor has been installed at the Central Eureka mine. A 50 H. P. dynamo supplies power.

The South Eureka mill is closed. At a depth of 2000 feet new levels are being opened up. Development work only will be continued for the present.

BUTTE COUNTY.

Work has been suspended at the Burroughs & Co. mine, McCabe creek.

CALAVERAS COUNTY.

Two carloads of concentrates are being shipped weekly by the Melones Co. from the 60-stamp mill to the Selby smelter.

The Oriole shaft is down 600 feet. Grading for the 10-stamp mill is completed.

The Gwin M. Co. will haul its lumber ordered at Valley Spring with a steam wagon.

INYO COUNTY.

The Inyo Gold Co., owning the Tuber mine at Ballarat, will build a 50-ton cyanide plant on the mill tailings at the Tuber.

KERN COUNTY.

The Red Rock Gravel M. Co. is incorporated; C. E. Van Meter, W. D. Barney, G. W. Lloyd, W. A. McGinn, of Randsburg, and C. Lloyd, of Santa Barbara; principal office at Randsburg.

Five miles from Havilah, the U. S. G. M. & M. Co. has three claims, a millsite with water and timber. The ore runs \$15. Northwestly 10 miles is the Mendara mine with a 15-stamp mill, also the property of the U. S. G. M. & M. Co.

The Randsburg Miners' Union demanded an increase in the wages of the car men at the Yellow Aster. Thereupon the Yellow Aster mine and mill were closed down, and 230 men are out of employment.

MARIPOSA COUNTY.

(Special Correspondence).—Development work on the Hayseed mine, Whitlock district, has reached the 300 level. Drifting is going on north and south on the vein, which is about 3 feet thick and of good quality. A new steam-hoisting plant gallow-frame, introduction of oil in

place of wood, etc., are changes in contemplation.

Fifty tons ore belonging to J. Teats were run through at the Ellingham mill last week. The ore is reported to have gone \$20 per ton. The mill is now running on a 50-ton run from Teats mine. They are taking out ten stamps from the old Whitlock mill.

Ten men are at Hite's Cove busy working.

Whitlock, Oct. 14.

Capt. A. H. Ward has about twelve men working on the Penon Blanco.

MADERA COUNTY.

Near Grub Gulch at the Mt. Raymond mine, P. Clark, of Spokane, is expected to start up work. It is a lead property, with 1½ mile of tramway from the mine to the reduction plant on Raynor creek. The mill cost \$50,000, and is run by water power. It is the intention to put in an electric plant for light and power.

MONTEREY COUNTY.

A bed of mica has been discovered in Monterey county by Walther & Jones, of San Jose, 6 miles east of Soledad.

NEVADA COUNTY.

The Winfield Scott or New Hartery mine is banded to Eastern men. It adjoins the Allison Ranch and the old Hartery mines. The bond is for six months and is for \$25,000.

The Idaho D. Co. has incorporated at Grass Valley; directors, J. H. Neff, J. Sonntag, J. E. Carter, R. Neall, C. E. Clinch, P. W. Michell, J. M. Thomas.

The Gold Blossom mine, recently reported sold, is bonded to California men who will put up a hoisting works, pumping plant and 8-drill compressor. A new double-compartment shaft will be sunk on the pitch of the ledge. It is the intention to sink 300 feet before starting to drift. Geo. Dyer has charge.

At the Posey mine Superintendent Bray has the shaft down 360 feet in ore; sinking will be continued to 500 feet.

The Old Blue lead, connecting Quaker Hill and Canada Hill, will be opened and developed.

PLACER COUNTY.

J. Manson is developing the Calf Pasture mine near Auburn.—At the Old Crater mine at Ophir active operations are to resume there in a short time.—The Boulder mine is unwatering the old works.

PLUMAS COUNTY.

Because of representations made by State Mineralogist Aubrey, Commissioner Hermann of the General Land Office at Washington has decided to hold up all entries of public lands in the Susanville district, pending an investigation. Recently the Sacramento Valley Development Association and the State Mineralogist memorialized President Roosevelt relative to the actions of timber land grabbers in the mountain counties, who are getting possession of timber lands on mineral entries and mineral lands on timber claims. There are three ways in which these mineral lands, including claims upon which assessment work has been performed, are being seized—by location as timber claims, by the use of forest reserve scrip and by illegal placer locations. The Federal Government is preparing to prosecute 100 dummy locators, who are alleged to have been identified with frauds in land matters. The Government has placed J. N. High, a special agent, in the field in the Susanville district to investigate.

SAN BERNARDINO COUNTY.

The John R. Gentry mines at Ludlow have been acquired by L. E. Porter, superintendent Bagdad mines, and B. E. Chase of Syracuse, N. Y. These mines adjoin the Bagdad property. It is the intention to do development work. Later on a stamp mill will be erected. They will be connected with the Ludlow branch of the Santa Fe, now building.

Twenty-eight engineers and assistants of the U. S. Geological Survey will rendezvous at The Needles between Oct. 15 and 20 to begin active work toward fulfilling the provisions of the National Irrigation Act in the thirty-two townships reserved along the Colorado river between The Needles and Yuma on the California side.

SHASTA COUNTY.

The first report of the Trinity Copper Co. to its stockholders says:

"The original property of the Trinity Copper Co. comprised 640 acres of mineral land; since then the company has acquired about 3655 acres of land, about 1700 of which is mineral land and the rest smelter and townsite.

"The only outside work has been done on our Statesman group, in which we have a good deposit of ore, and if it continues it will be unnecessary to furnish any flux for the smelter, although we have at the present time the Uncle Sam

group of mines under bond and lease, to determine their exact value, for the purpose of using the same for flanking ore.

"Since the company has been in operation, it has built thirty buildings, comprising an office building, including sleeping accommodations for manager and staff, assay building fully equipped, hospital, storehouse, miners' dwellings, and all accessories at the mine, including an equipped fire department.

"Under the direction and advice of our former mining manager, it was the intention of the company to erect with all possible speed a complete smelting plant of sufficient capacity to take care of the ore bodies then in sight. To this end plans were submitted to the directors and estimates asked for. At this stage the directors opened negotiations for a property in full operation, which, if acquired, would necessitate a radical change in contemplated plans. Owing to the unsettlement of metal market conditions these consolidation or purchase plans have not yet been consummated.

"Including our main working tunnel of 1145 feet, the work done on our property in opening up our ore bodies, including drifts, tunnels, etc., amounts to 7230 feet, or nearly 1 1/2 mile of underground workings. In addition, the number of feet of work done by our diamond drill was 5119 feet.

"From a report just received from Manager Brown the tonnage actually in sight and blocked out, ready for smelter, is 500,000 tons. This does not include the large quantity of ore that has been taken out of the mine, stored in our working tunnel, on our dumps, etc., nor the still larger quantity generally spoken of as in sight, but which is not blocked out ready for smelter.

"Our general manager has submitted his calculations, based on various prices of copper, and has shown that the company will be able to earn good dividends on his minimum hypothetical selling price of 11 1/2 cents for copper, gold \$20 per ounce, and silver 50 cents per ounce."

The Redding G. & C. Co. has bought for \$20,000 the La Plant and Bedford group near Keweenaw; the Stabler group near Centerville; the White group near Igo, and the Sky Blue group at the mouth of Middle creek. J. White, of Redding, is superintendent. A smelter is projected.

A consolidation is reported of the Bully Hill C. M. & S. Co. and the Mount Shasta G. M. Corporation. The deal is partially a transfer by J. R. DeLamar of the Bully Hill Co. to the Mount Shasta people. The holdings of the two companies will hereafter be operated entirely under the name of the Mount Shasta G. M. Corporation.

J. Harkins will be superintendent Blackstone, Isabel G., U. S. and Sunrise quartz mines and Bugle and Malcomb placer mines, Shasta district, bought by S. Waterman, of San Francisco.

Thos. Gilbert, president Redding G. & C. Co., says he will build reduction works on the Sky Blue mine, one of the company's recent purchases on Clear creek, 8 miles west of Redding.

On Clear creek near Horsetown, Theo. Herritz, of the Detroit and California M. Co., is getting a gold dredge ready for the winter's work.

SIERRA COUNTY.

Superintendent J. H. Stewart of the New Enterprise mine—the old Grand Prize property—has men at work.

SISKIYOU COUNTY.

Thomas & Ridenbaur will unwater the Siskiyon quartz mine on Humboldt. J. O. Rusby received a boiler and pumping plant at the Y. R. R. depot for his mine at Deadwood creek.

R. C. Hoover, New York manager Cherry Hill Q. M. Co., is settling up all legitimate bills against the mine. The work will be started up again.

SONOMA COUNTY.

The Socrates quicksilver mine is sold by T. J. Butts to Haas Bros. of New York. He asserts: "The figure at which the mine changed hands was \$800,000, and the money is to be paid down within a few days." He further says that "the engineers and others have returned to New York and the necessary documents for the transfer of the property have been sent East."

STANISLAUS COUNTY.

A. Hayward and E. P. Newball, who some time ago formed incorporations to develop and manage their quicksilver mining interests in the Coast Range, have formed three companies, the Pioneer, Hazard and Stanislaus Quicksilver.

TUOLUMNE COUNTY.

(Special Correspondence).—The Sierra Electric Power & Water Co. are applying to the General Land Office for reservoir site, right of way and site for their power plant on the North Fork of the Tuolumne river. The company plans to convey

power and water to the town of Tuolumne.

At the Spring Gulch mine, K. C. Parrish superintendent, a survey of the underground workings has been completed by J. G. Hopper, county surveyor.

At the Hunter mine, a claim near by, recently bonded to the same owners, the ore shoot has been struck at the cost of a few feet of development work. The rock is reported high grade.

Sonora, Oct. 13.

The Laurel G. M. & D. Co. has levied an assessment of 2 1/2 cents per share, delinquent Nov. 5.

The Albatross G. M. Co. is incorporated; S. Tyack, G. W. Kingsbury, J. C. Sims, W. G. Drawn, C. W. Penniman.

The Mohican M. Co. has built a suspension bridge across the Tuolumne river below their property.

The Hunter and Spring Gulch mines, near Carters, have been bonded to K. C. Parrish of Denver.

An extension of the old Dead Horse vein is reported struck in the center of the town of Tuolumne. It is planned to put up a hoist and a 20-stamp mill. Another shoot of ore is discovered in the New Era mine on the 200-foot level.

COLORADO.

ARAPAHOE COUNTY.

The suit of Attorney General Post against the American Smelting & Refining Co. has been thrown out by the Supreme Court, the court denying the application of the attorney general to file and suggesting that he first file the suit in the District Court. This was the suit brought by Attorney General Post to dissolve the smelter trust for alleged extortionate charges in restraint of trade. He said he would at once file a suit in the District Court against the trust.

BOULDER COUNTY.

At Eldora the Boulder Creek M. & P. Co., of Bay City, Mich., proposes to build a plant of 10,000 H. P., and to remodel and make the old Coburn mill, 6 miles above Boulder, into a cyanide plant of 100 tons capacity. A dam will be constructed and 3000 feet of water per minute deviated through a 36-inch pipe 1500 feet long, to a Pelton wheel connected up to a dynamo developing 2000 H. P. A fall of 4 7/8 feet is obtained in the 1500-foot pipe. The properties have been developed by 3000 feet of tunnels.

CHAFFER COUNTY.

Manager Goodwin of the Salida smelter says that the smelting company is in the field for the purchase of ores from Leadville.

CLEAR CREEK COUNTY.

P. Schnarr and associates have sold the Cleopatra mine at Empire to Chicago men for \$10,000. The property is on Silver mountain. It has been a producer of high-grade gold ores, averaging from three to ten ounces in gold per ton.

Idaho Springs says that at a depth of 150 feet Superintendent G. T. Pickett of the International G. M. Co. has entered a vein of smelting ore in the shaft of the Morgan mine, rich in copper and containing gold and silver, the assays giving a value of \$130 to the ton. The company owns eighteen patented claims, which will be ent by the Monarch tunnel. The belt of porphyry at a depth of 150 feet in the Morgan shaft, Mr. Pickett says, extends through all the claims in the group, which indicates that a continuous vein runs through the properties of the company.

The Georgetown Courier says the Kelly tunnel has advanced 4 feet through the Great Western vein and the footwall has not yet been encountered. The tunnel uncovered on the hanging wall 5 inches of galena, expected to yield 60% lead, \$10 silver and \$3 gold per ton.

Manager R. S. Grier, of the Woodbury M. & M. Co., Breckenridge mountain, has applied for patents for sixteen mining claims. The 600-foot tunnel has intersected six lodes. The water rights of the company are ample for milling and power drill, a 60 foot fall being secured.

The Pittsburg company that owns the Dover mine, at the mouth of Fall river, and the Brighton group, beyond the Freeland mine, will work their properties on a heavier scale. The Dover mine will have a new air compressor and sinking and drifting continued. About 10 feet of good concentrating ore has been opened at 200 feet.

E. W. Williams, manager Specie Payment mine, says his company will rebuild the Donaldson mill, 2 miles west of Idaho Springs. A tramway connects the Specie Payment mine with the Donaldson, so that hauling of ores from the top of Bellevue will be avoided.

J. T. King, of the Stanley mine, and H. A. Ridol, of Colorado Springs, are planning the new 100-ton mill to be erected below the Stanley mine.

CUSTER COUNTY.

The Maverick mine at Rosita, the first

mine opened in the county, has been bonded to the Custer Mining & Realty Co. The old workings are a total wreck and the machinery of not much value. The new possessors will prospect the ground by means of a new shaft and some extensive crosscutting.

EAGLE COUNTY.

C. E. Taylor, formerly president Denver Mining Exchange, is in the Gore range, 17 miles from Wolcott. "We have plenty of copper," said Mr. Taylor, "and also a good fluxing ore which carries lime and some silver and gold. We have 1000 tons of copper ore on the dump, but as it runs only about 10% our first attention will be devoted to getting out the fluxing ore. This ore is in demand at all the smelters."

FREMONT COUNTY.

Wilbur reports wolframite running 72% tungstic acid.

The American Zinc and Lead Works, south of Canon City, owned by the U. S. R. & L. Co., is being rebuilt. Five of the thirteen furnaces contracted to be built are finished.

GILPIN COUNTY.

(Special Correspondence).—The Ann Rutledge G. M. Co., near Central City, has recently cleaned out, retimbered and sunk one of the old shafts to a depth of 115 feet. A drift of 75 feet has been run at the 50-foot level and another one of the same length runs at the 115-foot level. The ore ranges from \$10 to \$25 per ton and the pay streak is from 16 inches to 3 feet wide. Enough now has been demonstrated to show the advisability of putting a stamp mill on the property at an early date. A large amount of mine timber has been secured and piled up at the mine, and arrangements completed for putting on a larger force for sinking the shaft to a depth of 500 feet. From this shaft drifts will be run east and west every 60 feet. This illustrates what a small amount of capital well spent will do for a mine once worked for its rich surface deposits in the oxidized quartz, and which was abandoned because of the high cost of mining, transportation and treatment prevalent in the early days.

Central City, Oct. 13.

The Fairfield G. M. Co. have shipped a carload of smelting ore to Denver and have sent out over thirteen cords, or a little over 100 tons, to the Hidden Treasure mills at Black Hawk. All of these ores came from the shaft while they were sinking.

Kurri & Walhardt, operating the Ohio mine in the Vermillion district, have returns of \$245 per ton for first-class ore and \$119.38 per ton for second-class from the Chamberlain sampling works at Black Hawk.

At the Barnes mine on Quartz hill the shaft, now down 600 feet, is to be sunk 100 feet farther.

Central City reports the Mammoth M., M. & D. Co. organized, E. J. Adams of Apex manager.

Shipments of smelting ore, crude ore and mill concentrates to Golden, Denver and other points from Black Hawk for the first week in October totaled 108 cars, or 2160 tons.

New York men, who own the Manchester group in Pine district, will unwater the Manchester mine, after which developments will be carried on in the 200-foot level.

A new 200-ton concentrator is under way at Golden, which, when completed, will operate in conjunction with the Carpenter smelter.

GUNNISON COUNTY.

In the gold belt the Good Hope mine at Vulcan is producing more ore than ever. New properties are commencing to ship.

At Pitkin the Maid of Athens and Citizens mines are keeping up their usual output. A. E. Reynolds of the Colorado S. & M. Co. is prosecuting work on various properties in the district.

In the Tin Cup district the Gold Cup, R. E. Lee and Enterprise are shipping ore.

HINSDALE COUNTY.

Lake City reports the 150-ton concentrating and cyanide plant of the Tobasco Co. is in successful operation at the head of Burrows Park.

At the Tucker mine, in Quartz Valley district, goes in a new concentrating plant for the Lyons-Kyle M. Co.

A Lako City special says the 4 1/2 x 14 shaft at the Ute and Ulay mines is down 150 feet; good headway is being made with air drills; the mines are producing two cars high-grade concentrates per day, or about 200 tons crude ore.

Manager Dryden, of the Pelican mine, is planning running a lower tunnel from a lower level than the present.

LAKE COUNTY.

Leadville says that during August the A. Y. and Minnie mill produced 1050 tons of concentrates—lead and zinc. In September the same plant produced 2700 tons of the same product. In addition to this

the mine shipped 2000 tons of crude ore; with the two the output was nearly 5000 tons.

The Ibez is shipping 300 tons per day. Should the smelters be able to take more siliceous ores this output can be increased. By Nov. 15 the new mill at the Resurrection will be completed and ready to treat ore. The management will hoist 650 tons of crude ore daily for the plant. This means the employment of a larger force of men. The New Monarch o. is producing 250 tons daily and when their smelter at Salida is blown in will increase the tonnage 200 tons a day more.

SAN JUAN COUNTY.

The sale of the Pickett lode, in Poughkeepsie gulch, to Eastern men, by B. Duval, for \$40,000 is reported. A payment has been made and the buyers have taken charge of the property.

About fifteen men are doing development work on the Wabuse M. Co.'s property in Homatito basin, Tower mountain, under the formanship of W. Lonorgan.

SAN MIGUEL COUNTY.

The Telluride Examiner claims that "the State record for tunnel driving is now held by Telluride. Last month the Japan tunnel was advanced 269 feet, which is 9 feet better than any previous record made in Colorado, the Newhouse tunnel at Idaho Springs having been driven 260 feet in one month, which was the former record. Each man working in the Japan tunnel was paid a bonus of \$20 for his work."

SUMMIT COUNTY.

The Breckenridge Journal says that next month the Gold Pan M. Co. will commence work on its proposed drainage tunnel, to carry the seepage water or underflow off from its placer workings. The tunnel will be timbered and have an opening 6x7 feet in the clear. The source of the water way will be about 80 feet below the surface of the ground, the expense approximately \$100,000.

At Breckenridge the Gold Pan has struck bedrock in their pit.

The Cashier mill is to be doubled in capacity and when fully in good working order will be again enlarged to a 60-ton, quick drop mill.

McDougall Bros. are taking out ore from the Black Hawk and DeSoto in Swandyke.

Manager F. M. Lindsley of the Free America mine at Kokomo will begin shipping ore.—The Boston group, on Gold hill, has been sold for \$22,000.—The Smuggler, Peerless and Matchless mines, on Fletcher mountain, have been leased and bonded to Anderson & Lindsley.—Ore has been struck in the Connors Bonanza tunnel, which is in about 1800 feet. They did not expect to strike ore before they had gone in 3000 feet.—Two new magnetic zinc separators have been put into the concentrating mill of E. E. Byron at an expense of \$10,000.—The Michigan mine, owned by G. T. McDonald, has men breaking ore.

TELLER COUNTY.

A strike is reported in the Shurtlo on Bull bill. The property is leased to the Valley City leasing company, which has spent \$45,000 on the property without result. The shaft is down 75 feet. In a trench 8 feet from the bottom a vein 3 1/2 feet wide is uncovered. Assays run \$80. It is sylvanite ore in phonolite and basalt formations.

On Cow mountain a tunnel has been started by the Clinton Con. Co. The portal is on the southwest base of the mountain. It is the intention to drive it in 3000 feet, at which point it will attain a vertical depth of 2000 feet. The tunnel will crosscut the veins of the mountain on its strike and ore should be opened, if there is any in the mountain.

The Colorado Springs Gazette estimates the number of men at present employed in the Cripple Creek district at 6200.

Johnson & Co., leasing on the 200-foot level of the main working shaft of the Pharmacist, have opened up over 5 feet of ore that assays indicate will average \$50 to the ton.

At Victor the War Eagle mine, in the bottom of the 35-foot shaft, has a vein of ore averaging in width from 13 to 15 feet, values running \$25. The lessees are taking out 100 tons per week.

J. T. Milliken, president of the Golden Cycle M. Co., has secured control of the Theresa property.

Daily output from Stratton's Independence mine now amounts to between 250 and 285 tons of ore.

Two to three carloads of 20-ounce quartz is being shipped weekly from the Kelley claim on Raven hill.

The Gold Coin, in process of opening up the old Dorothy vein in the 900-foot level, has opened up 300 feet of ore that runs from 2 to 3 ounces per ton in value.

Cripple Creek drainage now involves three propositions, before a committee appointed by the mine owners, the Newell, Bainbridge and Von Rucceau tunnels.

The first-named would afford temporary relief in a short time. The depth at which it would tap the main watercourses of the camp would be less than 100 feet below the standard tunnel level. The Bainbridge proposition would afford drainage 250 feet below, but would still be above the 1000 feet point, cutting the Elkton at a depth of 950 feet. The Von Rucseau is planned to cut the Elkton at a depth of 2650 feet and the American Eagle and the deepest point on Bull hill at 3700 feet, cutting below the district at an average depth of 300 feet. The Bainbridge tunnel would depend for funds on the mining corporations; the Newell or Rucseau propositions would entail no expense on the mining corporations until results are attained.

Another drainage tunnel project, the Oro Com. & D. T. Co. is being financed in the East. This would start on Wilson creek, 2 miles south of Victor, cut through Straub mountain at a depth of 1400 feet, and head for the Portland mine, which it would cut at 1700 feet.

On Squaw mountain seventeen properties are under development, employing fifty-five men averaging \$3.33 per day.

On Gold hill 540 men are at work, receiving a daily payroll of \$1764. Work is going on at thirty-three different places on the hill. The largest force of men employed is on the Stratton estate, where eighty men are at work on the Abe Lincoln and twenty-five on the Chicago & Cripple Creek property. The tunnel has been pushed in 3000 feet and has connected with the Globo hill properties at a depth of 728 feet, affording ample air and ventilation for the Globo hill properties. Mr. Stratton bought this tunnel for this purpose, and while some good ore bodies have been encountered, as in the Caille claim, its main object was for ventilation.

On the Anchoria-Leland fifty men have employment. Enough ore is being taken from the Cenundrum to meet all expenses. The Moon-Anchor is ready to resume mining of high-grade ore as soon as its ore shoots, now submerged, can be regained. This company is vitally interested in the deep drainage tunnel of Cripple Creek.

The C. O. D. property in Poverty gulch, under bond and lease to T. B. Burridge, is in ore.—On Tonderfoot hill work is being pushed on six properties. There are thirty-nine men employed, receiving an average of \$3.33 per day. The monthly shipments from the producers average 190 tons of \$55 ore, aggregate value being \$10,450.

IDAHO.

BLAINE COUNTY.

At Haley there are eighty miners at the Minnie Moore mine. The ore body on the 900-level is exposed for a length of 250 feet.

C. C. Ruthrauff, 30 miles west of Halley, has returns from a recent mill run on the ores to save \$19.20 in gold, \$1.15 in silver and \$5 in the tailings.

CUSTER COUNTY.

S. V. Le Sieur says he has found a "mountain of opals" on Panther creek, 45 miles northwest of Challis—a mount of porphyry near the summit of the range. "In this porphyry the opals are embedded and the matrix is so full of stones that fifty can frequently be taken from a chunk no bigger than a man's head. Most of them are broken, as the porphyry in which they are embedded was broken off from the ledges, and, when thus broken, appear in the matrix closely resembling pitch in a pine board."

IDAHO COUNTY.

The Dewey mine in Thunder mountain is working forty-two men. Superintendent Erwin says he expects to do about 500 feet of development work this winter. All ore now being milled is taken from development work. No stopping has been done.

At Buffalo Hump, thirty stamps are dropping on Crackerjack and Big Buffalo, owned by C. Sweeney, of Spokane. It is low-grade, free-milling ore.

LEMHI COUNTY.

(Special Correspondence).—The Calumet & Hecla G. M. Co., Ulysses, have just completed their new mill on Indian creek, about 45 miles from Salmon City. They will be able to handle about seventy-five tons of ore per day. The mill is 15-stamp amalgamation and concentration. The ore is free milling and will average about \$10 per ton. They are able to make about 80% saving on the plates. They have about $\frac{3}{4}$ of a mile of tramway and about 1 mile of flume. Also have 150 H. P. water power and a good steam plant. The plant is of the latest style and first-class in every particular.

Salmon City, Oct. 10.

At the new mining camp of Pattison the Ima Con. M. & M. Co. has been building. The company owns twenty-three claims on the north and south sides of Pattison creek in Lemhi county, 57 miles from Mackay. Mr. Knight is manager.

He is building a concentrator, daily capacity 100 tons, to be running by Nov. 15, when he will employ 100 men. He intends to run the mill for a year, and if satisfactory will add to the plant, increasing the capacity to 900 tons daily. The camp is lighted by electricity and has a system of water works and sewerage. The mines lie in the center and on each side of the gulch and are developed by tunnels, one of which is in 1200 feet and another 800 feet; the other claims will be tapped from these tunnels. The ore carries silver, gold and copper, the silver values being best, assays running \$75 per ton.

SHOSHONE COUNTY.

The board of directors of the Frisco Con. M. Co. want the stockholders to authorize a \$100,000 issue of bonds, with which to wipe out existing indebtedness, some of which is owed to the president of the company. It is stated by the directors that with the money from the bonds enough can be secured to pay the debt of \$30,000 and leave a balance on hand sufficient to commence operations. It is further stated that changes are in contemplation by which \$3 a ton on concentrates can be saved, and that it is believed that the mine can soon be operated at a profit. The directors also say that there is a movement under foot by which all the mines of the district are to be sold and that it would be better for the company to have a working mine when that time comes than an idle one. Further, the directors want authority to reduce the capital stock from \$2,500,000 to \$500,000, so that the company may save \$2000 a year in taxes. They say: In May, 1901, a contract was entered into between the company and the American Smelting & Refining Co., by which the company was to receive \$18,000 per month for a period of eight months from the smelting company. "This enabled us to reduce our indebtedness to the smelting company to the extent of \$30,000. On January 1, 1902, a new agreement was entered into, by which the smelting company paid us \$6000 a month, but they refused to make a new contract of this character on July 1, 1902, since which time the money has been furnished by our president for the purpose of keeping the water out of the mine, and the mine has been idle."

Near Mullan, the injunction served on the Gold Hunter M. & S. Co., at the request of the Yolande M. Co., has been set aside and the former can continue taking ore from the property of the latter company. The Hunter Co. has resumed work on the property.

At Delta the dredger of the Northern G. M. Co. is in operation.

R. I. Gleason, consulting engineer of the Rocky Mountain division of the Northern Pacific, has started out on the Cœur d'Alene branch with a party of engineers to make important changes. The party consists of twenty men. It is said that the Northern Pacific will take a step that has been contemplated for several years—that of changing the main line business and running it over the Cœur d'Alene line via Mullan and Wallace to Spokane. This plan has been considered feasible for some time and would shorten the line between here and Spokane by 80 miles. The Cœur d'Alene branch as it runs at present has some curves that are too short and some grades that are too steep to be acceptable for main line business.

J. G. Forester will put in a large cyanide plant at the Golden Chest property, near Murray.

Near Mullan, T. Donnelly, manager Snowstorm M. Co., has returned from the East with capital to continue development work on the Snowstorm property.

The Bunker Hill & Sullivan M. Co. will build a heavy dam across the south fork of the Cœur d'Alene river, near the mouth of Pine creek, to hold tailings.

Since the adjustment of the differences between the Cœur d'Alene mine owners and the lead trust the shipments of ore from that district have been phenomenally heavy. It has been difficult during the past week to get cars enough to handle the large amount of ore offered for shipment, and it is only within the past few days that the railway company has begun to catch up with the output of the mines. Wallace is busier than it ever was before; the entire Cœur d'Alene district has recovered from its recent depression and is on the top wave of prosperity.

Near Burke, after working on its property for nearly the past five years, the Sonora M. & M. Co. has encountered the lead at a depth of 600 feet in from the mouth of the tunnel 900 feet. It has been crosscut for a distance of $\frac{1}{2}$ feet. The ore is galena. The company owns twelve claims and a millsite.

KANSAS.

WYANDOTTE COUNTY.

A. R. Meyer, a director of the American S. & R. Co., is quoted as saying that the Argentine smelter, which was dismantled a year ago, will be reopened and

operated. "The Argentine smelter was closed down," said Meyer, "because the American S. & R. Co. had an excess of refining capacity. The plant has possibly the best location of any the company owns, and will not be abandoned."

MONTANA.

DEER LODGE COUNTY.

The Inter-Alta M. Co.'s gold properties at the head of Gold creek, 20 miles north of Anaconda, show a ledge of gold ore.

The Ontario mines group, 12 miles from Ellison, on the Northern Pacific Railroad, are to be unwatered. Extensive improvements in the way of new machinery are contemplated.

GRANITE COUNTY.

P. Mussighred, of Warm Springs, who owns sixteen mining claims and a 10-stamp mill at Garnet, suspended operations for the season. The shaft on the mine from which the bulk of the ore has been coming is 200 feet deep, which is about the limit of the machinery. To go deeper heavier machinery is necessary. When work is resumed, it will be on a larger scale, as the property will then be equipped with machinery necessary to do the work. P. O'Neill has had recent charge of the work. The former manager, M. Genzberger, had sunk the shaft 600 feet, cutting a vein of copper-silver ore. At a depth of 510 feet there was nothing to it. Exploration has cost nearly \$200,000, nearly 500 feet having been sunk in gravel wash.

JEFFERSON COUNTY.

The Basin & Bay State M. Co., at Basin, have leased all of that company's properties to F. A. Helms for four years, with an option to purchase the entire outfit at that time for \$345,000.

LEWIS AND CLARKE COUNTY.

The Montana Empire cyanide plant, near Marysville, has resumed operations with a daily capacity of 500 tons. J. L. Malm says the entire plant has been rebuilt at an expense of about \$16,000. He has installed a system of leading by automatic belt conveyors, which will facilitate the work, and has put in an electrical precipitation apparatus. On the dump there are now 125,000 tons of tailings, which he will work over by the process.

MADISON COUNTY.

The Gold Hill mine, near Parrot, is reported bonded to F. A. Helms of Butte; consideration, \$40,000.

At Rochester there are 113 men on the payroll of the Watseka and 17 on each shift at the Elgin, a mine near the Watseka.

At the Monitor-Revenue claim, Richmond Flats, a new up-to-date steam hoist is hoisting gold ore from the 160 foot level.

The Kennett M. Co., Richmond Flats, has thirty miners opening up new ground.

MISSOULA COUNTY.

A rich strike is reported at the 260-foot level by the Amador C. & G. M. & M. Co.—a body of copper ore 10 feet in width; on either side good milling ore.

PARK COUNTY.

At Jardine work on the new mill for the Bear Gulch Co. is proceeding. J. M. McNulta, manager Milwaukee M. Co. at Contact, has increased force at work.

SILVER BOW COUNTY.

C. A. Couch, of Boston, has acquired the Gold Hill mine, which adjoins the Bald Butte, and is sinking a shaft.

The mill at Kendall is crushing 300 tons of ore daily. The bulk of the ore comes from the west cut, now 75 feet wide and 100 feet deep. The new shaft is down 250 feet, where drifting goes on. The company's refinery is ready for work.

NEVADA.

DOUGLAS COUNTY.

Messrs. Wedekind and Blackburn, at the Golden Gate mine in Roderico canyon, have a large body of ore.

ELKO COUNTY.

H. G. Weston is developing the Baltimore group near Elko.

EUREKA COUNTY.

Ore shipments by rail from mines in Eureka district for the week ending Oct. 10 were as follows: Diamond, 126,900 pounds; Eureka Con., 122,960; Excelsior, 55,770; Jackson, 36,130; Richmond, 33,250. From Hamilton-Recco-Homestake, 51,280 pounds.

HUMBOLDT COUNTY.

Chicago men have bought the Foltz placer at Spring Valley for \$40,000. The property is 12 miles south of Unionville, 28 miles from Mill City, a railroad point on the Southern Pacific, about 100 miles from the California line. The Consolidated Placer Co. has been formed. J. P. Fitting becomes general manager for the new company. The placer beds have been worked for forty-five years and have produced \$3,000,000, which was taken from

shafts $\frac{3}{4}$ feet square sunk to a false bed-rock, from 6 to 75 feet below the surface. The beds along the low lands were never worked because of the superabundance of water which could not be drained off, but which can be successfully handled now. Twenty-three years ago J. B. Foltz purchased 280 acres of these diggings and exclusive rights to water along Indian creek, 9 miles distant. This water the new company will convey through 16-inch steel pipes to the placer. A dam has been constructed across Indian creek and a reservoir of a capacity of 20,000,000 gallons built. The water will be delivered to the placers with a fall of 200 feet and a pressure of 130 pounds to the square inch.

LINCOLN COUNTY.

J. Bone, who recently bought the McGregor mines, El Dorado canyon, has a few men at work and will increase the force.

J. B. McKee, Silver King district, Bristol, Nev., will develop his property there.

NYE COUNTY.

The 60-mile pipe line from Twin rivers to Tonopah will be finished in June, 1903. The 12-inch pipe is of fir, sawed to conform to the segments of a circle, coated with tar and wound with heavy galvanized iron wire. With a pressure of 250 pounds the water is forced through the pores of the wood; in the gullies and other places along the line where the pressure is high iron pipe will be used.

The option held for some time on a group of prospects at Pactolus has been dismissed, the men employed under it paid off and discharged and the mines shut down.

STOREY COUNTY.

East crosscut No. 2, which was recently started in the northwesterly drift on the 425 level of the Gould & Curry mine, is being advanced in porphyry and low-grade quartz.

On the 1600 level of the Mexican mine, the south drift from the west drift was stopped in porphyry and stringers of quartz after attaining a length of 31 feet, and a north drift was started to explore the quartz. When the north drift was in a short distance the quartz split up. Work has been resumed in the west drift, which is now in porphyry and quartz.

At the Union shaft the joint Sierra Nevada and Union Con. east drift from the station on the 1600 level is in 28 feet. The face is in hard porphyry. The south lateral drift from the joint west crosscut, 294 feet in, now has a total length of 49 feet and is in vein porphyry.

All prospecting work on the 220 level of the Union Con. mine has been stopped and the air pipes, rails, etc., are being removed to the surface.

In the Utah Con mine the station at the foot of the upraise in the north drift from surface tunnel No. 2 has been completed and they are now sinking a winze at this point in ore showing low value.

On the Brunswick lode grading for drill hole No. 3 is about completed and the drilling plant will soon be brought there from No. 2 hole for installation.

The water in the Chollar Combination shaft is slowly going down, being 160 feet below the measuring point. At the C. & C. shaft the large nozzle on elevator No. 2 has been replaced with a smaller one, and both Nos. 1 and 2 elevators have since been running alternately and are easily keeping the water down to the required point below the 2150 level station.

WASHOE COUNTY.

At the Sparks mill, Wedekind City, twenty men are at work; the mill is running steadily at the rate of twenty tons a day. The capacity will be seventy-five tons when the full equipment is received. The melting plant has been received and sulphides are being reduced. Shipments of four bars of bullion will be made daily.

C. Golding of Wadsworth has leased the mill of the Wadsworth M. & M. Co., in Olinghouse gulch, for a term of years.

The Colorado-Nevada M. Co. has started an upraise in a seam of ore on the 200-foot level.

Some ore from the Desert King mine, 4 miles from Reno, goes \$1 to the pound in silver and three ounces to the ton in gold. It was formerly known as the Wedekind-Bell mine. The shaft is 127 feet in depth; a vein 15 inches wide is in the bottom of the shaft. The ore is smelting.

WHITE PINE COUNTY.

At the Pilot Knob, near Ely, a large body of low-grade ore has been opened up by Superintendent Edwards. In the Ruth group, owned by Gray & Bartley, ore averaging 3.5% copper, \$4 in gold and three ounces silver has been uncovered at a depth of 300 feet.

NEW MEXICO.

LINCOLN COUNTY.

The Benito M. & M. Co. will do a general mining and milling business. C. C. Bourne of Nogal is agent.

The Eagle M. & I. Co., of Chicago, has

designated Parsons as the principal place of business and J. M. Rice as agent.

TAOS COUNTY.

The Otto M. & M. Co., is incorporated at Tres Piedras; directors, F. Bolton of Taos, O. Rosenfeld and J. W. Sibben, Manistee county.

OREGON.

BAKER COUNTY.

At Sumpter forty men are employed on the Olive Lake water power system by the Red Boy M. Co. to raise a dam 50 feet high, 450 feet long, base 60 feet, top 20 feet. Engineers estimate that an expenditure of \$150,000 will complete a plant assuring water for 2000 H. P. the year round, generate electricity for running hoist and compressor plants and supply other mines there.

T. W. Davidson has charge of development work on the Yellow Daisy group, near the Red Boy.

At the Bonanza mine the shaft is at the 800 foot level; a station has been cut on the 700-foot, and a crosscut started for big vein; sinking is constant under the contract system \$30 a foot being paid for the triple-compartment shaft. The 40-stamp mill of this property may be opened late this year.

J. J. Fawcett, owner of the Psyche, says the 20-stamp mill on the property is going up rapidly.

The foundation of the 70 stamp concentrator of the California mine is laid; the site for the 2899-foot tram cleared, and the contractors have begun erecting the stations for this line. Superintendent Walker expects to get the plant in shape before Jan. 1.

A. M. Paul, superintendent Imperial property, will sink 200 feet. J. Bourne, of Portland, and C. W. Nibley, of Baker City, own this property.

At the Columbia mine Manager Bailey is at work on a water power plant to generate 100 H. P., to make a big saving in the wood bill. At the present time the Columbia has wood cut aggregating in cost \$17,000.

The Baisley-Elkhorn mine is sold to F. P. Hayes and associates, price \$100,000, which includes all indebtedness against the mine. It has a 30-stamp mill.

Sumpter says another rich strike of ore has been made in the North Pole mine of the Cracker Creek district.

In the Morning Star group, Mormon Basin district, men are developing the claims. On the summit of the mountain between Shasta gulch and Mormon basin an Eastern company is locally credited with intention to spend \$75,000 on the erection of a 20-stamp mill and other improvements. A good body of ore has been uncovered. A 10-stamp mill is being built on the Kidd & Tedrowe property. W. E. King is carrying on extensive operations at the California, on California ridge. The mill is running night and day.

The Red Boy mine is going twenty-four hours each day. The May Queen is sinking on the shoot opened by tunnel. At the Blue Bird, Superintendent Thorpe is figuring on a mill. On the Oregon Monarch twelve power drills enable the management to progress with speed. The Chelan, operated by W. E. Hurd, has two forces working, one on the Bailey and the other on the Chelan. Superintendent Barrett has resumed work on the Grand Union, driving the Concord vein. The tunnel is in more than 300 feet. Work on the hoisting plant at the Excelsior mine is being rushed.

GRANT COUNTY.

The Quebec, 2 miles from Alamo, has a 10-stamp mill; active work is temporarily suspended; C. McMahon is manager. The Oro Fino, adjoining, has 800 feet of tunnel and bodies of free gold, panning metal, and concentrating ore; it is locally reported that the building of a 20-stamp mill is projected. The Aldrin Tunnel Co., W. Wade, manager, has run 1900 feet of double-compartment tunnel. A depth of 900 feet has been attained. The tunnel will be extended to a total length of 3000 feet. Two ledges have been cut, one ledge 6 feet showing average ore values of \$6 per ton.

The Magnolia mine at Granite will have an increased number of men at work in both tunnels, preparatory to starting the stamp mill in the spring.

A suit for the sale of mining claims, so that the proceeds may be divided between the three owners, and for the payment of \$50,000 to J. H. Parker, has been transferred to the United States court. Mr. Parker asserts in his complaint that, together with the defendants, he is owner of the La Belleview, South lode, Lolita lode, Hope lode, Mountain View lode and the La Belleview and Wild West mill-sites, known as the Cable Con. quartz mining claims. He also alleges that he has a lien on the claims for \$50,000. The plaintiff then avers that the property can not be partitioned without prejudice to the owners, and he therefore asks the

court for an order to sell the property, the first \$50,000 of the proceeds to be paid to him and the remainder to be divided between the three men.

The Cougar mine at Granite will resume.

The Paragon group of claims between the Cougar and Magnolia will be developed.

JOSEPHINE COUNTY.

The Simmons & Cameron mine, Waldo, has been worked fifty years and has enough ground in sight to keep the giants busy for years to come. A 1200-foot tunnel is being run to allow the passage of a waterway and make possible the working of ground that could not be reached in any other way.

B. E. Meredith, manager and owner of the Meredith placers, Waldo, has returned from Chicago and will work the properties for the fourth season. It is in these placers that a Philadelphia company has been mining for platinum the past summer and have had good success. It is there, also, that the metal, Josephinite, is found in quantity. One feature is a 1200-foot tunnel driven through solid rock, being necessary to let the main flume through to the working grounds of the mine.

The Old Channel mines, Galice, will begin work whenever water is afforded. Three giants will be operated. The placer bank has a length of 1300 feet, and a height where it is being piped of 230 feet. Such a bank as this can only be worked from a distance of 400 feet, requiring a pressure of 500 feet in the giants. This carries values all the way from the grass roots to the bedrock, carrying fine gold in the clay capping and coarse gold in the lower strata.

Manager W. H. Hampton, of the Columbia placers of the Grave creek district, is in readiness for work. He will operate two and three giants in the diggings this year. Three other giants are required to operate the elevator for removing the waste. Arc lights are suspended above the diggings for night work. The banks are a gray and red gravel, carrying values in fine and coarse gold. They occupy the bed of an ancient channel.

J. C. Whipp has located the Josephine county caves under the placer mining laws to mine. It will require 6 miles of wagon road before stone can be hauled out. He has located and entered 1320 acres, which cover all the caves and land adjacent.

W. H. Brevoort of New York is at Greenback. He is the owner of the Greenback mines and mill and has arranged for ten new stamps with a battery of twenty, to be supplemented with a filter press of German invention to treat the slimes. The workings have attained a depth of 900 feet.

SOUTH DAKOTA.

CUSTER COUNTY.

The Central Black Hills C. Co. has been incorporated by Drake, Barnes & Co. of Cleveland, O., they having purchased the Richard Palmer ground on Spring creek, near Custer. E. M. Barnes is preparing to install a 200-ton leaching plant, to employ a process of his own in leaching the ore. He claims to be able to treat ore of the character found on the Palmer ground running as low as 1% copper, successfully. The company has a vein of copper carbonate ore averaging 3% at a point 200 feet above water level. Mr. Barnes says he operated a similar plant successfully in Arizona.

The Copper Cliff M. Co. has men on its property, 2 miles north of the Black Hills Co.'s ground, taking out graphite for shipment to Chicago; C. Fohrman is manager. He says there is a demand for it at a good price.

LAWRENCE COUNTY.

Deadwood says that the University M. & M. Co. has bought the thirty-two acres of mining ground that belonged to the South Dakota M. Co., on Annie creek, and is at work on the deposits of siliceous ore, getting ready to begin mining and milling. The work is in charge of R. Fitzgerald, formerly of the South Dakota Co. He has a mill in view to treat the ore by the cyanide method.

The Lucky Strike M. Co. will build a stamp mill on their mining property on Box Elder creek, near Roubaux.

The Spearfish M. & S. Co., in a relief clean-up at the mill for the first part of September, got a return of over \$6400. A large body of pay ore has been opened up in an entirely new location. It is 7 feet in width and extends into the side of the hill.

UTAH.

BEAVER COUNTY.

A 15-mile race, with a mining claim as the prize, was won by J. Douglas of Milford. The claim involved was the Copper King, located in the Granite range between Beaver and Milford. E. Clark of Richfield sued Stoddard & Kirk of Mil-

ford for possession of the claim. The case was tried; late in the afternoon the judge decided the case in favor of Clark, as against the defendants, but in his decision intimated that Clark's failure to go ahead and perform the assessment work when he had an opportunity to do so amounted to an abandonment of the claim, which would leave the ground open for relocation. This decision was immediately telephoned to Milford, and Douglas started for the ground. He reached the claim in an hour and a quarter and posted a location notice. W. Robinson followed him two hours later and witnessed his location. Meantime J. Gray, acting for Mr. Clark, started from Beaver and arrived later. He also posted a location notice for Clark & Davis. He was followed by E. Pollett, who was a witness for the later location. If the claim is of any value there will be the usual litigation in such cases.

At Milford the Gomer group of two claims in the heart of the Majestic company's Harrington-Hickory group is bought by the Majestic Co. for \$20,000, \$1000 down, \$4000 Dec. 3, \$6000 Feb. 3 and \$6000 April 3.

JUAB COUNTY.

The 900-foot shaft on the Godiva will be sunk to a depth of 1500 feet.

At Eureka Superintendent Matthews of the May Day has a body of silver-lead ore. A machine drill is heading for the ore channel on the 250-foot tunnel level, 900 feet below the surface of the ledge.

SALT LAKE COUNTY.

Work is to be resumed by the Pine Tree M. & M. Co. near Bingham.

The St. Joe long tunnel is now in 1560 feet, 3 to 6 feet per day being made in hard rock. Manager Hasbrouck says the tunnel is nearing a vein, from which a raise will be made for air. It is flowing about 150,000 gallons of water daily and the volume gradually increases; present vertical depth 500 feet.

The Morning Star at Bingham is to open up the ledge by which it is traversed, the Frisco tunnel will be extended and an air compressor and machine drills will be put in.

SUMMIT COUNTY.

The Park Record reports the shipments of ore from the Mackintosh sampler for the past week as follows:

	Pounds.
Daly West.....	2,810,000
Ontario.....	922,000
Anchor concentrates.....	257,000
Loring Bros.....	147,000

Total.....	4,036,000
Silver King.....	1,581,140

Grand total.....5,617,140

TOOELE COUNTY.

At Ibapah, Superintendent S. F. Whitney of the J. P. Gardner mines says he has pumps with capacity of fifty-five gallons per minute, and on the 20th will begin unwatering the property.

The Midas M. & M. Co. has its new 60 H. P. boiler and 50 H. P. engine.

WASHINGTON COUNTY.

The Paymaster group, St. George, is under bond to A. J. Malloy of Cripple Creek, Colo., for \$80,000.

WASHINGTON.

FERRY COUNTY.

Development work on the Gold Ledge, Republic, has closed down indefinitely. Lack of funds and of a market for the ore is the reason for the suspension.

OKANOGAN COUNTY.

A. B. Lee of Wooster, O., Eastern agent Six Eagles M. Co. at Loomis, says he will be able to raise all the funds necessary to make a paying mine out of the Six Eagles.

WYOMING.

ALBANY COUNTY.

The Rambler M. & S. Co. has held its first monthly meeting. The services of a mining engineer from the East have been secured and he will take charge of the property. Development work will be pushed throughout the winter. The principal stockholders in the new company are M. M. Green and W. H. Webber, Laramie; J. F. Shelton, O. Harrell, G. W. Harnden, E. Freeland and C. W. Cheney, Shelbyville, Ind.; F. M. Wooten, J. A. Swenson and N. O. Stoucks, of Madison, Wis.

L. Miller, superintendent Queen M. Co., has assays on ore from the Colorado mine, Jelm district, \$29.52 in copper, aside from a paying percentage of gold.

CARBON COUNTY.

The aerial tramway of the North American C. Co. is finished. It connects the Ferris-Haggerty mine with the smelter at Encampment. The buckets contain 700 tons each of ore and are carried over the lines at intervals of half a minute, being dumped automatically. There are three cables, the traction cable, which is continuous, and two track cables between the

stations, the buckets being automatically transferred from one track to another at stations. This gives the tramway a capacity of 984 tons a day. On the line there are 270 spans, averaging 200 feet. The longest span on the line is near the Blackfoot property, 2200 feet. The general raise on this span is 800 feet, the highest point is 225 feet above ground. The loftiest tower is 69 feet high and has an altitude of 9922 feet above sea level. The line is so constructed that spurs can be built off from it at any point along the tramway. Number of towers, 270; four tension stations are double; number of feet of cable, 293,275, weighing 439,696 pounds; number of feet of timber used, 1,250,000; average number of men employed for six months, 200; cost, \$300,000.

Rudofeha reports that in a crosscut of 65 feet at a 60-foot level the Osceola Copper M. Co. has found a lead apexing on its property adjoining the Ferris-Haggerty on the south. The new discovery is held to be of importance because it is thought to demonstrate that ore there lies in large and continuous bodies instead of in pockets.

FOREIGN.

BRITISH COLUMBIA.

At the Broken Hill M. & D. Co., 7 miles east of Ymir, twenty-four men are working. The ore is free milling and carries values in gold, silver and lead. A mill capacity of twenty tons per day goes in.

Shipments from Rossland for the week ending October 11, and for the year to date, are as follows:

	Week. Tons.	Year. Tons.
Le Roi.....	3,710	176,716
Le Roi No. 2.....	952	50,951
Center Star.....	1,830	15,381
War Eagle.....	1,380	8,046
Rossland G. W.....		2,400
Giant.....	90	2,575
Cascade.....		300
Columbia-Kootenay.....		30
Bonanza.....		90
Velvet.....	110	800
Spitzee.....		20
White Bear.....		5

Totals.....8,072 257,314

The Nickel Plate mine, in the Similkameen country, near Hadley City, will have a 60-stamp mill and concentrator in operation by next spring. M. K. Rogers is manager.

MEXICO.

(Special Correspondence) — The Fernando M. Co., San Fernando, Durango, are building a wagon road from Culiacan, Sinaloa, Mex., to their camp, a distance of 85 miles. Courtenay de Kalb is general manager of the company.

C. F. Jaques has resigned as purchasing agent of the Cananea Con. Copper Co to take a position on the road with Baker & Hamilton of San Francisco.

The Yaqui S. & R. Co.'s office in Hermosillo and works at San Antonio de la Huerta, District of Ures, have purchased new smelting machinery, which they state will be in operation in one year.

Geo. Mitchell, general manager of the C. C. Co., claims to have a second Cananea in a new mine, the Mitchell M. Co., 35 miles from Acapulco.

A. W. Buchard, second vice-president and controller of the C. C. Co., left Cananea for New York the first of the month.

N. B. Roper is consulting engineer for the Cananea Con. Copper Co.

Thos. Chase Paxton of Los Angeles, president and general manager of the Loma Verde Copper Co., near Tucson, returned to Tucson from a visit to the coast. Cananea, Oct. 10.

Zacatecas reports that the San Rafael mines, reduction works and machinery have been sold to A. E. Stillwell for \$160,000 cash.

The Guggenheim Exploration Co. is reported to have bought the gold mines and a small smelter at Vellardena for \$5,000,000. The principal owners of the property were E. W. Nash and G. C. Barton of Omaha and Mrs. J. Mathews of Denver, Colo. "The Guggenheim Exploration Co. has been negotiating for the property, I know, but I do not know if it has succeeded in acquiring it," says J. B. Grant. "The smelting company has no interest in the deal as a company. However, if the Guggenheim Co. does acquire the property, it is probable that the smelting company will erect a big smelter there to treat the ores. In that way only will the smelting company be interested."

DURANGO.

(Special Correspondence) — The La Reina G. M. & M. Co., Mapimi, have an incline shaft down on their property 240 feet and have done 200 feet of drifting on the vein from the shaft. The vein averages in width from 6 to 9 feet and will run \$20 per ton gold. They will erect a mill for the treatment of the ore, which is a

cyanide proposition as well as free-milling. R. L. Wotton of El Paso, Texas, is manager.

The Ujela mine at Mapimi was worked 300 years ago by the Spaniards. The company has finished a 600-ton smelter in addition to the one they already had of 800 tons capacity. They are handling 1200 tons per day. They are only working their low-grade ore at present, as they have a concession from the Government by which they can ship their bullion out free of duty if it is 50% lead. They have 1000 houses at the mine for the use of their men. The property is controlled by a French company.

Mapimi, Oct. 11.

At Mapimi is being developed the Ouella mine, belonging to the Pinales M. Co., made up mostly of German capitalists. The reported yield is \$4,500,000 per year. A trainload of the lead and silver hullion leaves the smelter daily to be shipped to the United States and Germany. The company is now erecting a plant for the recovery of arsenic which will be made into an important item of revenue which is now lost. The arsenic is so excessive in quantity that it causes sickness. The ores there need the siliceous ones of Parral for fluxing purposes and the smelter pays a premium for them.

C. Reid, manager Compania Minera de Penoles, at Mapimi, denies the reports of the excessive death rate at the mines of the company at Mapimi and that the mortality was due to arsenic in the drinking water. He states that the civil register of deaths is 132 for this year as against 111 for the corresponding period of last year, and that the water is in no wise the cause of the sickness. He says further that every year there is more or less intestinal trouble among the native workmen, due to eating stale fruit, etc., and their habits.

OAXACA.

An American miner, returned from Oaxaca, tells the El Paso Herald that in the mines of Oaxaca "labor, the great desideratum in mining, is so cheap that an honest American can hardly look his men in the face when he pays off."

"There are two systems of labor prevailing in the hiring of miners; one to pay by the running meter and the other day wages. The former costs \$7 to \$9, Mex., per meter, and the drifts and tunnels are 5 feet high and 4 feet wide. The rock is very hard. For this class of work the miners, the Indians of the country, furnish their own caps, fuse, powder and candles, delivered at the surface by the mine owners at 50% advance on the cost. Thus the cost is about \$1.66 per foot in gold.

"On day work a good drill man can be had for 75 cents Mexican money and a helper at 50 cents. These two men furnish their own candles, powder, caps and fuse, supplied them at the usual 50% profit by the mine owner. Some drill men get only 50 cents a day and furnish nothing but their candles.

"Where Mexican mill men are employed they get \$3 per day, Mexican money; carmen get 36 cents a day and furnish their own candles. An ore sorter gets 25 cents a day, and his wife who helps him gets 12 1/2 cents.

"These laborers are slow workers, but they are faithful and patient, and can be depended upon. They can be hired as "cargadores," or carriers, for about 25 cents a day. One of them can carry 100 pounds 25 or 30 miles a day and make the distance quicker than an American will on horseback."

SINALOA.

The Rio Yaqui International Transportation & Metallurgical Co. is organized in Denver, Colo.; C. S. Thomas, L. M. Goddard, W. Faulkner. They have eighteen mines in the Rio Yaqui valley, 125 miles from the Gulf of California, 175 miles southeast of Hermosillo. The mines carry silver, gold and copper; all of them have been developed, some having been worked for thirty years. The mines are nearly 200 miles from a railroad and only the richest of the ore has been shipped out. There is said to be now on the dumps 150,000 tons ore. The plans of the new company include the building of a smelter at the mines, or some near-by point, whose capacity will be 2500 tons daily.

SONORA.

The Greene Consolidated Copper Company reports for the year ended July 31, 1902, that during the past year the installation of a plant and equipment upon the property necessary for the production of 6,000,000 pounds of copper per month has been practically completed. The statement of investments of Cananea shows the total amount expended in the development and equipment of the property to July 31, 1902, to have been \$3,682,072 in the mining division, \$1,471,237 in the reduction dividend and \$1,837,965 in the miscellaneous investments. Upon a con-

siderable portion of the undeveloped area of this ground surface croppings, it is said, indicate the presence of additional ore bodies.

President Greene says that the depreciation in the price of copper from 17 to 11 and 12 cents per pound has retarded the payment of dividends by the company, but the finances of the company are in good condition and dividend payments will soon be resumed. Six smelters are now in operation and the seventh will be put in commission about Dec 10. The converter plant of the company is now completed and has a capacity of producing 8,000,000 pounds of copper per month. Eight main working shafts are now being operated.

The Yaqui S. & R. Co. has a \$150,000 furnace ready to go in at San Antonio de la Huerta, Ures district, where they will establish a reduction and refining plant.

The Chicago & Sonora M. Co., with a gold property near San Antonio de la Huerta, has had built and ready for shipment a 20-stamp mill, air compressor, tramway and other machinery to be set up and put into operation. Wagon roads, pumping plant and pipe line are completed. R. C. Coy of Chicago is president of the company.

NORWAY.

At the close of 1900 there were fourteen groups of mines in Norway, embracing silver and silver ore, gold, copper ore, pyrites (partly cupriferous), nickel ore, cobalt slick, iron ore, zinc ore, chromium ore, mangan ore, molybdenite, rutile, apatite, feldspar. In 1899 these mining industries gave employment to 2457 workmen and produced altogether 162,570 tons of raw material, valued at £255,058. Of this, £217,066 worth was exported, the United Kingdom taking half of it, the next largest quantities going to Germany, Sweden, Russia and Holland. The most important copper mines are those at Roros, yielding by the Bessemer process 95.5% of copper. And at Roros also the most important chromium ores are found. But the Roros mines, the Vice-Consul at Trondhjem states, suffered from a strike last year from March to the close of the year. Thus only about 14,000 tons of ore were extracted, and of this quantity 8000 tons were export pyrites and 600 tons copper ore, yielding 341 tons copper. The Killingdal mines also turned out less, but the prices were good. Next in importance are the Sultelma mines in Salten, Nordland, employing about 700 men and producing annually about 39,000 tons pyrites.

PERU.

From an official pamphlet recently issued by the Peruvian Government it is learned that in that country the mineral code provides that every person can take up as many claims as desired, sixty being the limit. Placer, coal and petroleum claims measure 40,000 square meters. In other cases they consist of a rectangle measuring 200 by 100 meters, or 20,000 square meters. Each claim costs the owner 30 sols per annum, which is equivalent to \$15. The administration of mining affairs is exercised by the Government, with the assistance of a superior counsellor and deputations and delegations situated at the mining centers. Foreigners are entitled to be members of these deputations. Gold is found in sixteen provinces, placers in two, and in almost every river of the eastern region. Besides gold and silver, there are deposits of copper, cinnabar, iron, sulphur, coal, salt and petroleum.

SOUTH AFRICA.

A report of the Chamber of Mines shows that at the close of last June there were employed in the gold mines of the Transvaal 6727 white men and 59,416 negroes. This was an increase of 2359 whites and 10,144 negroes over the number reported January 1. In June about one-third of the milling capacity was employed.

Johannesburg sends word that the revised customs tariff gives general satisfaction. By it the cost of living will be reduced, and the mining and agricultural industries will be materially benefited. The special duty of 6 cents each on poles, 2 cents a pound on sulphuric acid, 6 cents a pound on lead and 12 cents a pound on copper wire have been canceled. All iron will be admitted free, and the cost of building will be greatly reduced by the reduction of the rates on cement and timber. The existing duty on dynamite is left unaltered, owing to the fact that the questions bearing upon the conditions regulating the manufacture and importation of the explosive into the Transvaal colony are under discussion. This duty will be dealt with separately.

The September output of gold from the South African mines was about 175,000 ounces, an increase of 12,000 ounces over the output in August of this year, the largest output for any month since Sep-

tember, 1899, when the output was 411 762 ounces. In October, 1899, owing to the outbreak of the Boer war, the output fell to 19,906 ounces. For the greater part of 1900 and in the early months of 1901 production ceased. Since May of 1901 there has been an almost steady and fairly rapid increase in production.

THE KLONDIKE.

Dawson reports, "The Government has established a test stamp mill here for quartz assays."

"The Ladue M. Co. has bought two-thirds interest in quartz properties near here for \$200,000 and will erect a 100-stamp mill on the property next summer."

Personal.

E. L. TOBIAS is manager Atlantic mill, Empire, Colo.

L. C. DOTY is superintendent Ely M. Co., Ely, Nev.

J. A. PANTING is manager Gold Hill mine, Durkee, Or.

C. I. STEVENS is manager Stevens C. Co., Metcalf, Ariz.

CHAS. WALDEN is manager Last Dollar mine, Victor, Colo.

H. H. CLARK is superintendent Sparks mill, Wedekind, Nevada.

A. V. BOHN, of Leadville, Colo., has returned there from Denver.

J. Y. MCKANE, of Roslyn, B. C., is visiting Tooele, Nevada.

B. F. JAMES has returned to San Francisco from Oaxaca, Mexico.

F. M. DRESCHER has returned from Central City to Denver, Colo.

C. ROCKLIDGE has charge Queen of Sheba mine, Deep Creek, Utah.

R. L. WOOTTON has returned to El Paso, Texas, from Denver, Colo.

D. E. BIGELOW has returned from Calaveras county, Cal., to San Francisco.

J. S. FREE is superintendent G. & S. M. Co.'s properties, Park City, Utah.

W. J. GIRD has returned to Tucson, Arizona, from a mining trip to Mexico.

GEO. BEEBE is general manager Ciene-guita M. Co., Sahuripa, Sonora, Mexico.

L. C. WHITNEY is manager Cripple Creek-Idaho G. M. Co. at Liberty, Colo.

H. B. MAXSON of Reno, Nev., is re-elected secretary National Irrigation Congress.

E. L. BALLOU will return from Pony, Montana, to Igo, Shasta county, Cal., Nov. 1.

C. B. NEEL of Montana has taken charge of the Sumpter, Oregon, smelter now being erected.

MISS MOLLIE O'BRYAN, of Cripple Creek, Colorado, is president the Teutonic G. M. Co.

E. F. STUART, master mechanic Trade Dollar Con. Co., Silver City, Idaho, has resigned.

J. L. WHITNEY has resigned as head timberman Jumper mine, Stent, Tuolumne county, Cal.

JOSEPH D. YOUNG is elected manager of the Silver Cliff G. & C. M. Co., Wallace, Idaho.

E. E. BYRON, manager Summit M. & S. Co., Kokomo, Colo., has returned there from Denver.

W. W. WHITING, Western manager Diamond Rubber Co. of Denver, Colo., is in San Francisco.

W. DOUGLAS, general manager Copper Queen Co., has returned to Bisbee, Arizona, from the East.

E. L. RICKARD is now manager Triumfo M. Co., La Paz, Cal., where he arrived on the 14th ult.

A. G. WEHE, manager Night Hawk mine, has returned to Loomis, Wash., from Milwaukee, Wis.

HERBERT VISSCHER, U. S. Debris Commission, has returned from Butte county, Cal., to San Francisco.

WINTHROP H. WICKHAM, of Denver, Colo., is spending a few weeks at his old home in Norwalk, Ohio.

B. TEAGARDEN, who has been examining California mining property, has returned to Boulder, Colo.

J. E. BEVERIDGE is consulting engineer and assistant to Manager Snyder, Dixie mine, St. George, Utah.

D. E. HELLER is superintendent the new smelter of the Calumet & Arizona M. Co., at Douglas, Arizona.

A. F. CROSSE is now consulting chemist to the East Proprietary Mines, Ltd., Boksburg, South Africa.

F. S. HARRIS, manager La Dorada mine, Sonora, Mexico, is visiting his home in Kansas City, Mo.

C. L. BUCKINGHAM has returned to Denver, Colo., from Ulysses, 45 miles from San Francisco, Idaho, where he is erecting

an amalgamation and concentration mill for the Calumet & Hecla M. Co.

E. T. WOLVERTON is in charge of the Colorado Fuel & Iron Co.'s manganese mine at Little Grand, Utah.

J. S. MURPHY, superintendent Findley mine, Goldfield, Colorado, has returned there from British Columbia.

E. H. BEEBE has succeeded M. Gleason as superintendent Wild Horse mine, U. G. M. Co., Cripple Creek, Colo.

J. J. BROWN of the Little Johnny mine, Leadville, has returned after an eight months' trip through Europe.

O. R. WHITAKER is superintending the mines of the New York & Honduras Co., San Juanito, Honduras, C. A.

W. H. AUBURY has gone to Sandy, Nev., to take charge of the cyanide plant of the Nevada-Keystone M. Co.

J. H. SANBORN, Pacific Coast agent Leyner drill, has returned from Nevada county, Cal., to San Francisco.

J. M. HUMES of Butte has charge of development work in the placers of French gulch, Beaverhead county, Mont.

W. L. SHAFFER will take charge of the Pittsburg Con. M., M. & T. Co., Freeland, Clear Creek county, Colo., Nov. 1.

J. C. O'NEILL, manager Silverton M. Co., Silverton, Colo., has returned there after a month's sojourn in Denver.

C. R. CORNING, of Olcott, Corning & Peale, New York, N. Y., has been examining mining property at Ely, Nevada.

E. R. TUFTS, general manager Sinaloa-Sonora M. & S. Co., has returned from New York to Alamos, Sonora, Mexico.

W. J. PARKER, general manager Urique G. M. Co., Urique, Chihuahua, Mexico, has returned there from San Francisco.

LEWIS SEARING, general manager Denver Engineering Works Co., has returned to Denver after an extended visit through the East.

J. R. CHAPTON, of Los Angeles, Cal., has been making examination of the Cripple Creek Con. M. & T. Co., French gulch, Colo.

GEO. L. WALKER of the San Francisco branch American Steel & Wire Co. is expected to return to California from the East next week.

A. B. FRENZEL, who has been in Europe making experimental tests on vanadium and uranium ores, has returned to Telluride, Colo.

THOS. RICKARD, vice-president of the firm of Harron, Rickard & McCone, San Francisco, leaves to-day for a six-weeks Eastern sojourn.

R. N. DICKMAN, of Dickman, Mackenzie & Potter, mining engineers, of Chicago, is in Joplin examining lead and zinc mining properties.

JAMES SKEAFF, manager Mohawk M. Co., Prescott, Arizona, is visiting Angels, Cal., where he engaged J. Davis as foreman Mohawk properties.

JOHN KISSICK has resigned as foreman at the Highland mine, Deadwood, S. D., and is succeeded by T. J. Danielson, former foreman at the Homestake.

M. ELLIOTT, a former California mining superintendent, returned last week to Johannesburg, South Africa, where he will resume charge of a mine.

JOHN K. MACKENZIE, of Dickman, Mackenzie & Potter, mining engineers, of Chicago, is at Gilt Edge, Montana, looking over the Gilt Edge mine.

J. D. SWORD and W. H. YOUNG have returned to San Francisco from Mexico, where they examined mining property at Copala, 65 miles from Mazatlan.

E. H. LUNKEN, of Denver, Colo., president Lunkenheimer Co., is spending a few weeks in Cincinnati, Ohio, looking after the interests of the Lunkenheimer Co.

HANS C. BEHR has been awarded a gold medal and 40 guineas by the Consolidated Gold Fields of South Africa, for his article on "Winding Plants for Great Depths."

H. E. HUNTINGTON, of the Southern Pacific Co., and H. T. Scott, of the Union Iron Works of San Francisco, are elected directors Greene Consolidated Copper Co.

W. E. ELLIS, formerly superintendent the Colorado Zinc Co., at Denver, Colo., has resigned his position and is now looking after some mining interests near Salmon City, Idaho.

A. HOULE, manager Gold S. M. Co., Wallace, Idaho, is in San Francisco to get a hydraulic elevator. He goes thence to New York City, returning to the Idaho property next spring.

C. W. VAN LAW, who for three years has been with the Smuggler-Union Co., San Miguel county, Colo., as superintendent of mill construction, has resigned to enter the employ of the Allis-Chalmers Co., Chicago.

W. THOMPSON, consulting engineer Slough Creek, Ltd., has returned from

British Columbia to London. He spent three months at the Cariboo Gold Fields mine and the properties of the Cariboo Consolidated.

F. L. BROWN, formerly manager San Francisco branch Washburn-Moen Co., before its absorption by the American Steel & Wire Co., has returned to San Francisco from New York City, with a view to engaging in business.

H. A. SHIPMAN, formerly general manager Stratton's Independence, S. Loeb, former superintendent, and G. Gill, one of the contractors on the property, sail for London next Monday for South Australia, where they have secured positions.

S. A. PARNALL says he is not to take the superintendency of the Trimountain at Houghton, Mich., as previously arranged, but will go to another property in Mexico, 200 miles south of El Paso. This leaves Captain Chynoweth still in charge of the Trimountain.

E. MCGINNIS, formerly superintendent Druid G. M. Co.'s property, Hinsdale county, Colo., is in Shasta county, Cal., examining mines for the Coates family, Paisley, Scotland, and is succeeded by J. Anderson, who will have charge of the work at the Colorado property.

T. J. GRIER, superintendent Homestake M. Co., South Dakota, has returned from a visit to the Alaska-Treadwell mine, Douglas Island, Alaska. He says the company is dropping 830 1000-pound stamps and crushing on an average 5000 tons of ore a day. The stamps drop ninety-eight times a minute in a low-issue mortar with 20-mesh screen, the capacity per stamp being 5.6 tons. At the Homestake in Lead 900 stamps weighing 900 pounds each drop 86 to 88 times a minute, and using 35-mesh screen, making four tons per day to the stamp. Water is employed for three-fourths of the power at the Treadwell and steam for one-fourth. Sixty per cent of the ore comes from the open-cut and 40% from underground.

Commercial Paragraphs.

R. W. HUNT & Co.'s offices are now located at 1121 Rookery Bldg., Chicago, their laboratories still being on the twelfth floor of that building.

DICKMAN, MACKENZIE & POTTER, mining engineers and assayers of Chicago, have changed their office to 1120 Rookery Bldg., Chicago. The laboratories of the company have been much enlarged lately and new appliances have been placed therein.

A. J. McCONE of Harron, Rickard & McCone has bought the Nevada Foundry and machine shops, Reno, Nev., and will increase the size and capacity of the plant. A hoiler shop will be one of the additions to the place. It is locally reported that the McCone works at Virginia will be moved to Reno to be incorporated with the plant there.

THE Mine & Smelter Supply Co., Denver, Colo., are in receipt of the following orders: Thirty-six Willey tables for Montana Ore Purchasing Co., Butte, Mont.; seven Willey tables for Daly Judge mill at Park City, Utah; and recently expressed on an order from their El Paso house six Durkee drill plants complete to the El Paso & Northeastern Ry. They have also shipped forty-one water jackets for furnaces to Cananea Copper Co., La Cananea, Mexico.

McFARLANE & Co., of Denver, Colo., have orders for the following: One Ajax drill sharpening machine for the Center Star M. Co., Ltd., Roseland, B. C.; one Ajax drill sharpening machine for Bunker Hill & Sullivan M. Co., Kellogg, Idaho; one Ajax drill sharpening machine for Wm. A. Clark, Butte, Montana; one 9x15 crusher for A. Y. & Minnie mine, Leadville, Colo.; one fuel oil heater, 20 feet long, 6 feet diameter, and twelve side dump ore cars, 54x66 inches, for Portland Cement Co.

THE Llewellyn Iron Works of Los Angeles, Cal., has the contract for the new 500-ton concentrator for the Shannon Copper Co., Clifton, Ariz. The plant will be on the hillside above the smelter, to which the ore will be elevated after passing through the crushers. The building enclosing the plant will be of steel and iron. The work of construction will be rushed and it is expected the plant will be in operation Feb. 1, 1903. Briquette machinery will be installed at the smelter and will be ready when the plant starts up.

THE J. H. Montgomery Machinery Co. of Denver, Colo., report an increase in their export business for the last year. Among their recent foreign shipments are large orders of mining machinery to Chile and Peru, South America, and a consignment of Common Sense steel whips to South Africa. Their business with Mexico has more than doubled in the past year, and recent shipments to that country include a 50-ton copper smelter and three

carloads of ore cars and ore buckets. The Stanley G. M. Co. of Idaho have pay ore in shipping quantities and will begin operations on an extensive scale; they have ordered a mining plant complete from the J. H. Montgomery Machinery Co., including a 60 H. P. engine, hoiler, cars, ore buckets, track, etc.

New Patents.

DEWEY, STRONG & Co.'s SCIENTIFIC PRESS PATENT AGENCY, 330 Market St., S. F., has official reports of the following U. S. patents issued to Pacific coast inventors:

FOR THE WEEK ENDING OCTOBER 7, 1902.

710,400.—COAT AND HAT LOCK—G. E. Allen, S. F.
710,338.—SAWING APPARATUS—J. A. Brines, Fresno, Cal.
710,321.—HOOK AND EYE—Dora S. Daily, S. F.
710,912.—FISH CLEANING MACHINE—A. J. Farmer, S. F.
710,655.—GARMENT SUPPORTER—F. Ferguson, Santa Rosa, Cal.
710,682.—MOTOR LOCK—G. S. and A. G. Guenther, Los Angeles, Cal.
710,663.—FASTENER—A. Haug, S. F.
710,689.—MASSAGE MACHINE—W. W. M. Hickey, S. F.
710,690.—GOLD SEPARATOR—W. W. M. Hickey, S. F.
710,580.—FUEL—C. J. Holmes, S. F.
710,462.—SETTLING TANK—R. D. Jackson, Reno, Nev.
710,859.—RAISING WRECKERS—Johnson & Jacobson, Chicago, Wash.
710,700.—BORING TOOL—J. Lund, S. F.
710,501.—CARRIAGE POLE AND NECK YOKE—M. McNutt, S. F.
710,599.—FOUNTAIN PEN—J. P. Murdock, San Diego, Cal.
710,897.—QUICKSILVER FURNACE—R. Scott, San Jose, Cal.
710,719.—WRENCH—J. J. Seeman, Barstow, Cal.
710,898.—OIL BURNER—E. J. Sharp, Alhambra, Cal.
710,899.—OIL BURNER—C. W. Sievert, Los Angeles, Cal.
710,900.—LAWN RAKE—F. A. Smith, Los Angeles, Cal.
710,732.—PADLOCK—H. A. Smith, Los Angeles, Cal.
710,813.—CONVEYOR—J. W. Stancart, S. F.
710,814.—ADVERTISING DEVICE—E. Steinhauser, Waterville, Cal.
710,903.—LID CONTROLLER—L. J. Sticklin, Chehalis, Wash.

Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

MASSAGING MACHINE.—No. 710,689. Oct. 7, 1902. Dr. White Wolf, San Francisco, Cal. This apparatus is especially designed for carrying out the various operations of massaging and manipulating the various parts of the body of the patient. It consists of a framework carrying shafts having eccentric members, said shafts journaled across the framework; pulleys are mounted upon the shafts and belts from which motion is transmitted to rotate them. There are connecting rods having flexible joints and handles and belt attachments whereby the movement of the said eccentric members is transmitted to the body, and means for varying the length of the stroke of the eccentric members.

GOLD SEPARATORS.—No. 710,690. Oct. 7, 1902. Dr. White Wolf, San Francisco, Cal. This invention is designed for the separating of gold from sand and other material with which it may be associated, and means for saving and retaining the gold. It consists in a novel arrangement of suspended oscillating sluices and riffles, a means for supplying water and material and distributing the same over the surfaces, means for arresting the gold and separating it from the sand and discharging the sand from the apparatus.

COAT AND HAT LOCK.—No. 710,400. Oct. 7, 1902. G. E. Allen, San Francisco, Cal. The object of this invention is to furnish a simple form of lock that can be carried in one's pocket and which is quickly engaged and disengaged with a hat or coat, and which can be easily secured to a hook, nail, ring, or the like. It consists of two arms, one of which is movable in relation to the other, said arms adapted at one end to receive and retain a fabric, the other end of the fixed arm carrying jaw members which are adapted to inclose a hook or nail, one of said jaws movable and adapted when open to allow the arms to open and when closed to prevent the arms being opened, and a pawl and ratchet mechanism whereby the said jaws are locked.

GARMENT SUPPORTERS.—No. 710,675. Oct. 7, 1902. F. Ferguson, Santa Rosa, Cal. The object of this invention is to provide a drawers supporter which may be quickly attached to or detached from the suspender, is adjustable to various necessary lengths and which is adapted to take layers of cloth of any weight or thickness. It consists of flexible grip members adapted to engage the garment to be supported, said members comprising an elastic sided yoke or holder, one of which is slidable and retained in a cylindrical extension of the other side, a stud or button having a resilient covering of rubber, felt, or the like, said button adapted to be engaged by an elastic loop, and means by which these grip members may be attached to a suspender or the like.

FISH SPLITTING AND CLEANING MACHINE.—No. 710,912. Oct. 7, 1902. A. J. Farmer, San Francisco, Cal. Two-thirds assigned to J. P. Haller and C. P. Hale of same place. This apparatus is designed to split and clean fish. It consists of a series of rollers having teeth or spikes adapted to engage and carry the fish, means by which said rollers are adjustable for fish of different sizes, mountings for the rollers by which the first rollers encountered by the entering fish present approximately vertical gripping surfaces, and these are gradually inclined until at the discharge the surfaces of the rollers are presented downwardly, so as to flatten out the fish for drying or similar purposes. Intermediate between the rollers is a splitting and gradually spreading device by which the fish is opened out in unison with the gradually changing faces of the pressure rollers and mechanism in conjunction therewith by which the entrails are cleaned out during the progress of the fish through the apparatus.

Latest Market Reports.

SAN FRANCISCO, Oct. 17, 1902.

METALS.

SILVER.—Per oz., Troy: London, 23½d (standard ounce, 925 fine); New York, bar silver, 50½c, refined (1000 fine); San Francisco, 50½c; Mexican dollars, 44½c San Francisco, 41½c New York.

COPPER.—New York: Standard, \$10.65@11.00; Lake, 1 to 3 casks, \$11.55; carload lots, \$11.15; Electrolytic, 1 to 3 casks, \$11.45; carload lots, \$11.25; Casting, 1 to 3 casks, \$11.40; carload lots, \$11.25. San Francisco: \$14.00. Mill copper plates, \$17.00; bars, 18@24c. London: £52 spot per ton.

The figures of domestic production for the month of September show 25,788 tons, against 21,580 tons in 1901. The production for the nine months of the current year was also in excess of the corresponding period last year, the figures being 218,281 tons, compared with 199,626 tons.

LEAD.—New York, \$4.12½; Salt Lake City, \$3.50; St. Louis, \$4.00; San Francisco \$4.50, carload lots, 4½c 1000 to 4000 lbs.; pipe 5½, sheet 6, bar 5½c; pig, \$4.75. London: £10 13s 9d per ton.

SPELTER.—New York, \$5.50; St. Louis, \$4.50; London, £19 5s 0d per ton; San Francisco, ton lots, 6½c; 100-lb lots, 7c.

ANTIMONY.—New York, Cookson's, 9½c; Hallett's, 8½c; San Francisco, 1000-lb. lots, 10c; 300 to 500 lbs., 11c; 100-lb. lots, 13@15c.

TIN.—New York, pig, \$25.50; San Francisco, ton lots, 28c; 1000 lbs., 29c; 500 lbs., 29½c; 200 lbs., 29½c; less, 30c; bar tin, 3½c. London, £116 10s spot.

PLATINUM.—San Francisco, crude, \$18.00 ½ oz.; New York, ingot, \$19.00 per Troy oz. Platinum ware, 75@80c per gram.

QUICKSILVER.—New York, \$48.00 large lots; London, £8 15s; San Francisco, local, \$46.00 ½ flask of 76½ lbs.; Denver, \$49.65. Export, \$44.50.

BABBITT METAL.—San Francisco, No. 1, 10c; No. 2, 7c; No. 3, 6½c; extra, 17½c; genuine, 35c; Eclipse, 37½c.

ALUMINUM.—New York, No. 1, 99½ pure ingots, 35c; No. 2, 90c, 30c to 34c.

SOLDER.—Half-and-half, 100-lb. lots, 18½c; San Francisco, Plumbers', 100-lb. lots, 15½c.

NICKEL.—New York, 50@60c ½ lb.; ton lots, 45@48c.

STRUCTURAL MATERIALS.

IRON.—Pittsburg, Bessemer pig, \$22 50; gray forge, \$20.00; San Francisco, bar, 3c ½ lb., 3½c in small quantities.

STEEL.—Bessemer billets, Pittsburg, \$31 and \$31.50; open hearth billets, \$32 and \$32 50; San Francisco, bar, 7c to 12c per lb.

CHICAGO CURRENT QUOTATIONS.

Bessemer.....	\$25.00@25.50
Foundry Northern 1.....	24 00@26.00
Northern 2.....	23.50@25.00
Northern 3.....	22 00@23.50
Southern 1.....	24 15@26.15
Southern 2.....	23 50@25.55
Southern 3.....	23 00@25.15
Forge.....	20.00@20.65
Charcoal.....	25.00@24.50
Billets, Bessemer.....	33.00@34.00
Bars, iron.....	1 85@1.95
Bars, steel.....	1 75@1.85
Rails, standard.....	28.00@30.00
Rails, light.....	34 00@40.00
Plates, holler.....	1 90@2.00
Tank.....	1 75@1.80
Sheets, 26 store.....	3 25@3.40
No. 27.....	3 35@3.50
No. 28.....	3 45@3.60
Angles.....	1 75@1.80
Beams.....	1 75@1.85
Tees.....	1.80@2.00
Zees.....	1.75@2.25
Channels.....	1.75@2.25
Steel melting scrap.....	19.50@20.00
No. 1 railroad wrought.....	21.00@22.00
No. 1 cast, net ton.....	16.50@17.00
Iron rails.....	24.00@25.00
Car wheels.....	21.00@22.00
Cast borings.....	10.00@10.50
Turnings.....	14.00@14.50

CEMENT.—Germania, \$2.75; K. B. & S., \$3.00; Hewmoor, \$2.95; Trowell, \$2.95; Portland, \$3.25 per bbl.

LIME.—Santa Cruz, \$2.25; Roche Harbor, \$2.25 per bbl.

LUMBER.—(Retail): Pine, ordinary sizes, \$20.00@22.00; extra sizes higher; redwood, \$22.00@23.00; lath, 4 feet, \$4 25 @4.50; pickets, \$19.50; shingles, \$2.35 for No. 1 and \$2.00 for No. 2; shakes, \$13.50 for split and \$14.50 for sawed; rustic, \$26.00 @32.00.

The receipts of lumber at San Francisco from all sources, by months, have been as follows:

Month.	1901.	1902.
	Feet.	Feet.
July.....	20,385,000	45,020,000
August.....	21,312,000	47,122,000
September.....	18,602,000	41,691,000

NAILS.—Per keg (list prices): No. 20d to 60d, Wire, \$3.30; Cut, \$3.30; 10d to 16d, Wire, \$3.35; Cut, \$3.35; 8d, Wire, \$3.40;

Cut, \$3.40; 6d and 7d, Wire, \$3.50; Cut, \$3.50; 4d and 5d, Wire, \$3.60; Cut, \$3.60; 3d, Wire, \$3.75; Cut, \$3.75; 2d, Wire, \$4.00; Cut, \$4.00. Special rates for carload lots.

GENERAL SUPPLIES.

POWDER.—F. o. b. San Francisco: No. 1. 70% nitro-glycerine, per lb., in carload lots, 15½c; less than one ton, 17½c. No. 1*, 60%, carload lots, 13½c; less than one ton, 15½c. No. 1** 50%, carload lots, 11½c; less than one ton, 13½c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2*, 35%, carload lots, 9½c; less than one ton, 11½c. No. 2** 30% carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 728 kegs, \$1.50 per keg; less car lots, \$2 per keg.

CAPS.—3x, \$5.50 per 1000; 4x, \$6.50; 5x, \$8; Lion, \$9, in lots not less than 1000.

FUSE.—Triple tape, \$3.60 per 1000 feet; double tape, \$3.00; single tape, \$2.65; Hemp, \$2.10; Cement No. 2, \$3.00; Cement No. 1, \$2.65, in lots of 3000 feet and up.

CANDLES.—Granite 6s, 16 oz., 40s., 10½c ½ set; 14oz., 40s., 9½c.

COAL.—San Francisco, coast, yard prices: Wellington, \$8; Seattle, \$6.50; Coos Bay, \$6.50; Southfield, \$8.00. Cargo lots, Eastern and foreign: Wallend, \$7.00; Brymbo, \$7.50; Pennsylvania, hd., \$14.00; Scotch, \$8; Cumberland, \$12; Cannel, \$9.50; Welsh Anthracite, \$13.00; Rock Springs, \$8.50, long ton; Colorado Anthracite, \$14.00. Coke, \$10.50 per ton in bulk, \$13 in sacks; Sunnyside, \$8 50, long ton.

CHEMICALS.—Cyanide of potassium, 98½-99%, johning, 27@28c ½ lb.; carloads, 25@26c; in 10-lb. tins, 35c; sulphuric acid, in carboys, 66½ B, 2c ½ lb.; soda ash, \$2.00 ½ 100 lbs.; hyposulphite of soda, 2½@3c ½ lb.; blue vitriol, 5½@6½c ½ lb.; horax, concentrated, 7@8c ½ lb.; chlorate of potash, 12@13c; roll sulphur, 3c; alum, \$2.00@2.25; flour sulphur, French, 3½@3¾c; California refined, 2@2½c; nitric acid, in carboys, 8c ½ lb.; caustic soda, in drums, 3@4c ½ lb.; Cal. s. soda, hbls., \$1.25 @1.50 ½ 100 lbs.; sks, \$1.05; chloride of lime, spot, \$2.50@2.60; nitrate of potash, in hbls, 8c; caustic potash, 10c in 40-lb. tins; sulphide of iron, 9c ½ lb.

OILS.—Linsed, boiled, hhl., 57c; cs., 62c; raw, hbl., 55c; cs., 60c; lots of 5 hbls., 10 less; Lucol oil, hbl., 50c; cs., 55c; raw, bbl., 48c; cs., 53c. Kerosene—Pearl, per gal., 20c; Astral, 20c; Star, 20c; Extra Star, 24c; Eocene, 25c; Elaine, 22c; Water White, in bulk, 13½c; Mineral Seal, iron hbls., 19c; wooden hbls., 22½c; cs., 25c; Mineral Sperm, cs., 26½c; Deodorized Stove Gasoline, hulk, 17c; do., cs., 23½c; 86° Gasoline, hulk, 21c; do., cs., 27½c; 63° Naphtha or Benzine, deodorized, in bulk, per gal., 16c; do., in cs., 22c; Lard Oil, No. 1 bbl., 95c; cs., \$1.05; Neatsfoot Oil, hbl., 70c; cs., 75c; No. 1 hbl., 52½@55c; cs., 57½@60c; Sperm, crude, 60c; Natural White, 65c; Bleached do, 70c; Whale Oil, cs., 55c.

WHITE LEAD.—Per lb., in kegs: Five tons and over at one purchase, per lb., 6c; 1 ton and less than 5 tons, per lb., 6½c; 500 lbs. and less than 1 ton, per lb., 7c; less than 500 lbs., per lb., 7½c; in 25-lb. tin pails, ½c per lb. above kegs price; in 1 and 5 lb. tin cans, 100 lbs. per case, 2½c per lb. above kegs price. Dry Lead—in bbls., 1 ton and over, 6c; do. in kegs, 6½c.

RED LEAD AND LITHARGE.—One ton and over at one purchase, per lb., 6c; 500 lbs. and less than 1 ton, per lb., 6½c; less than 500 lbs., 7c.

ASSAY LITHARGE.—Per lb., 8½c.

BISMUTH.—Sunbtrate, per lb., \$1.60.

BONE ASH.—4c ½ lb.

BORAX.—Crystall, 7c; calcined, 25c.

CHROMIUM.—(90% and over) per lb., \$1.25.

COPPER.—Carbonate, 20c; Red oxide, 60c.

MANGANESE.—(90% and over) ½ lb., \$1.25.

MERCURY.—Bichloride, ½ lb., 90c.

MOLYBDENUM.—25c. ½ gramme; 1000 grammes—2½ lbs.

PHOSPHORUS.—(American) ½ lb., 80c.

SILVER.—Chloride, ½ oz., 75c; nitrate, 55c.

SODIUM.—Metal, ½ lb., \$1.00.

URANIUM.—Oxide, ½ lb., \$3.50.

ZINC.—Metallic, chemically pure, ½ lb., 50c.

ZINC.—Dust, ½ lb., 10c.

ZINC.—Sulphate, ½ lb., .04c.

(These prices are wholesale, f. o. b. San Francisco, unless otherwise noted.)

THE CALIFORNIA DEBRIS COMMISSION,

having received applications to mine by hydraulic process from J. E. Jones, in Jones' mine, near Bulards Bar, Yuba County, Cal., draining into Oregon Creek which reaches Yuba River; and from J. F. Covery, in Browns Flat Mine, near St. Louis, Sierra County, Cal., draining into State Creek which reaches Yuba River; gives notice that a meeting will be held at Room 96, Flood Building, San Francisco, Cal., Nov. 3, 1902, at 1:30 P. M.

A GOLD MINE FOR SALE.

Over \$100,000 worth of ore in sight. Water power, machinery and 20-stamp mill on the premises.

Address M. Z. F., this office.

MINING AND SCIENTIFIC PRESS

Whole No. 2205.—VOLUME LXXXV.
Number 17.

SAN FRANCISCO, CAL., SATURDAY, OCTOBER 25, 1902.

THREE DOLLARS PER ANNUM.
Single Copies, Ten Cents.

Platinum Geologically Considered.

"The Geological Relations and Distribution of Platinum and Associated Metals" is the title of Bulletin No. 193 of the U. S. Geological Survey, by J. F. Kemp. The work is a notice and discussion of the various places throughout the world where platinum has been reported, with such evidence as would tend to give the report credence, with a careful summing up of the whole matter and a presentation of what is now most clearly known regarding the economic geology connected with this important metal.

It is here to be noted how persistently error perpetuates itself, even in U. S. government reports. Mr. Kemp is excellent authority and usually most reliable, but he admits as authentic an alleged discovery of platinum in the copper ores of the Rambler mine, 50 miles southwest of Laramie, Wyoming. At the time of the stated find two samples were sent to this office and accurate analysis failed to show a particle of platinum. That platinum was so contained was widely announced at the time, but the fact of its non-existence there now appears to be substantiated.

The concluding pages of the work give some practical points to the practical miner, wherein the author indicates that in placers the platinum has been mostly derived from peridotites, and in less degree from pyroxenites, gabbros and syenites. Regarding the latter, he says that geologists have long appreciated the importance of the peridotites, but have not generally realized that, in a minor degree, the syenites are also of wide distribution and that they likewise deserve emphasis. Thus, for example, they are recorded in the Urals, in Colombia, Brazil and British Columbia.

Quoting the author's words at length, he notes that platinum or palladium has been observed in veins in connection with gold at Tilkerode in the Hartz; in Minas Geraes in Brazil; at Santa Rosa in Colombia, and at Beresovsk, Russia. Whether the platinum or palladium is or is not associated in these localities with other metallic sulphides does not appear from the incomplete records.

Platinum as a subordinate component in complex antimonial sulphides of copper and other metals occurs in veins at Guadalcanal, Spain, and probably also in veins in the Val du Drac and elsewhere in eastern France. While this association is as yet only

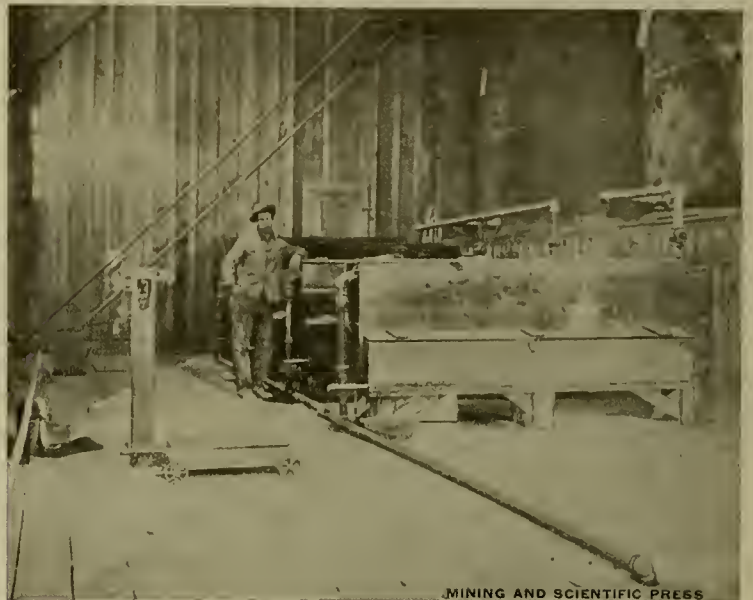
of mineralogical interest, it nevertheless shows that platinum can occur in this way, and makes it desirable that similar ores be tested where found.

Where platinum is disseminated in eruptive rocks it occurs in two forms. The first is the arsenide, sperrylite, associated with copper-nickel ores in uraltized norites, at Sudbury, Canada. In the second form the platinum in the native state is contained in basic eruptives, more especially peridotites. The platinum is frequently involved in a very intimate way with chromite. In the most natural interpretation of the phenomena the two minerals are regarded as having crystallized in the normal passage of the fused magma to the solidified condition. It should be clearly stated, however, that two views have long prevailed regarding chromite. Its deposits which are large enough to mine are so uniformly in serpentine, and are so often of such great extent, that the chromite has been believed by some to be a product of metamorphism. Its masses are supposed to be segregations which have resulted from the change of anhydrous chromium bearing silicates to the hydrated form, with attendant separation of chromic oxide.

On the other hand, chromite has been looked upon as a true igneous mineral; it has been discovered in basic eruptives, not in the least changed to serpentine, and it has, therefore, been believed to be, even when in serpentine, an unaltered survivor from a previous anhydrous magnesian eruptive.

In the case in which platinum has been discovered in quantity in the country rock (on Mount Soloviev, Nijni-Tagilsk district) it has been associated with an altered and serpentinized or even carbonated form

of peridotite. It is fair to raise the question whether the presence of the platinum is in any way connected with this excessive alteration, or whether the change has happened to take place where the platinum was previously abundant. In the Tulameen district, British Columbia, Mr. Kemp found platinum in serpentinized belts along dislocations, but many belts have also been tested which gave no platinum. In these occurrences the platinum is so excessively fine that evidence is not easily attainable as to its relations to the mother rock. In the present state of our knowledge it might be possible to develop an argument, not easy to refute, that the platinum in these surroundings had entered in solution or had been deposited in connection with the secondary changes; and yet from a study of many nuggets, and from very careful and detailed observation of the peridotite on the Tula-



Precipitating Room, Horseshoe Gold Mining Co., Fay, Nevada. (See Page 237.)

meen, it is his belief that the platinum is, in far the greater part, a true igneous mineral. This belief rests upon the following grounds: First—Some nuggets contain the platinum associated with perfectly fresh olivine, and the relations are precisely those of two minerals which have crystallized from fusion and of which platinum is the older. Had there been any secondary introduction of platinum, so sensitive a mineral as olivine would have shown some signs of change. Second—The platinum and chromite can be satisfactorily explained, as regards their relations, on the basis that the chromite is a slightly older mineral, which has become involved in and with the platinum, and that the latter has crystallized a little later. That the period of the much more abundant chromite has lasted into that of the rarer platinum, or even longer than it, is quite possible, because of the influence of the principle of solution. Chromite is more infusible than native platinum. No mineral in a fused magma can crystallize out at a temperature above its fusing point.



The 100-Ton Cyanide Mill, Horseshoe Gold Mining Co., Fay, Nevada. (See Page 237.)



Assay Office, Tailings Dump and Wood Yard, Horseshoe Gold Mining Co., Fay, Nevada. (See Page 237.)

MINING AND SCIENTIFIC PRESS.

ESTABLISHED 1860.

Published Every Saturday at 330 Market St., San Francisco, Cal.

TELEPHONE, DAVIS 771.

ANNUAL SUBSCRIPTION:

United States, Mexico and Canada.....\$3 00
All Other Countries in the Postal Union..... 5 00

Entered at the San Francisco Postoffice as second-class mail matter.

Chicago Office (Telephone, Harrison 78)737 Monadnock Block.
Denver Office (Telephone, Olive 733).....606 Mack Block.

J. F. HALLORAN.....Publisher.

San Francisco, October 25, 1902.

TABLE OF CONTENTS.

ILLUSTRATIONS.—The 100-Ton Cyanide Mill, Horseshoe G. M. Co., Fay, Nev.; Precipitating Room, Horseshoe G. M. Co., Fay, Nev.; Assay Office, Tailings Dump and Wood Yard, Horseshoe G. M. Co., Fay, Nev., 231. Surface Showing of Copper Ore, Cumaral Mines & Development Co.; Prehistoric Arastras and Buildings, Cumaral Mines & Development Co.; Ancient Smelters and Buildings, Cumaral Mines & Development Co.; Croppings of Ore, Cumaral Mines & Development Co., 238. Belt Conveyor as Tailings Stacker, 238. Mining and Metallurgical Patents, 239-240.

EDITORIAL.—Difficulties and Delays of the Inventor; Low Costs of Mining and Milling Gold Ore; Structural Material from Europe; Big Prices for Prospects; Standpipes as Metallic Reservoirs; Settlement of the Coal Strike; Improvements in Electricity; The California Miners' Association; "History of a Catalogue," 232.

MINING SUMMARY —241-242-243-244-245.

LATEST MARKET REPORTS.—246.

MISCELLANEOUS.—Platinum Geologically Considered, 231. Concentrates, 233. Electricity in Mine Operations, 234-235. The Cumaral Property in Sonora, Mexico; The History of a Catalogue, 236. The Traveling Salesman; Details of Cyaniding, 237. Robins Belt Conveyors as Tailings Stackers, 238. Mining and Metallurgical Patents, 239-240. Personal; Commercial Paragraphs; Obituary; Catalogues Received; Notices of Recent Patents; New Patents; Mineral Statistics for 1901; What the California Miners' Association Has Done—1892 to 1902, 245-246.

To ILLUSTRATE the difficulties and delays that beset the path of the inventor may be mentioned that it is only within the last few months have been issued two United States patents that were applied for in 1885 and 1887. They both related to the distribution of alternating currents of electricity by means of transformers. To "hold up" a patent for seventeen years is somewhat unusual, even in the U. S. Patent Office, the cause in these two cases being a legal contest in the Patent Office between rival claimants to priority of invention.

WHILE authenticated accounts of extraordinarily low costs of mining and milling gold ore have been repeatedly published herein, such facts are to be considered somewhat phenomenal; that is, there is something in each of such cases specially favoring unusually low totals of cost. The fact that such totals at the Spanish mine, Nevada county, Cal., were 80 cents per ton, or at the Alaska-Treadwell mine are \$1.31 per ton, does not make it logically follow that gold ore anywhere can or ought to be mined and milled for such a low figure.

CONTRADICTION of trade conditions make necessary the importation of structural material to this country from Europe. Despite the great output of United States manufactures, Western progress is retarded by inability to secure material. A case in point is afforded by the new Denver, Northwestern & Pacific Railway, which has been obliged to order 50,000 tons steel rails from Antwerp. This Denver-Salt Lake road in turn asked rails from the Colorado Fuel & Iron Co., then from Pittsburg, and lastly from the Illinois Steel Co., only to be told that it was impossible to furnish them. Then the European order followed. The Southern Pacific Railway Co. has been obliged to do the same thing. The Antwerp firm guarantees to furnish the rails at a price that, with the import duty added, totals a little under the quotations of the American steel rail makers. It is not a complimentary comment on Pacific coast progress to note the great iron deposits this side of the Sierras, the present low price of fuel oil, the great and growing demand for iron and steel, and yet the placing of an order for rails in Belgium.

CONSIDERABLE is being said and sung, and with great show of justice regarding the man who has a mining claim and who only does just enough of work on it to hold it. It is pointed out that whatever wealth is in it must be developed, and that he is only a dog in the manger if he doesn't either work it or let some one else do it. And yet, after all, it is his property, just as much as is a valuable street-corner lot the property of some one who holds it unimproved and unproductive, each alike, having to pay the penalty of taxation on such unproductiveness. A man has a

right to pay high taxes on a city lot or to do annual assessment work on a mining claim just as long as he wants to. It isn't business, but that doesn't affect his rights in the matter. In the case of the miner the chief silliness is holding on to the claim in hopes of getting a big price for the prospect when any one can come in and make as good a location for \$200 as the other wants \$10,000 for. Usually when the man who is holding on finds that he can't get the \$10,000 or \$50,000, he says some one "knocked" the deal, when it is his own inability to see the facts as they really are.

WHERE it is not easy to find an elevated site for a reservoir for water supply, it is common to erect trestles and surmount them with steel tanks, or else to use the cylindrical metal reservoir known as a standpipe. Standpipes are by far the most common form of metallic reservoirs, but steel tanks supported at the requisite height on steel trestles are now very often preferred as a cheaper and safer way of supporting the effective upper column of water, 20 to 30 feet high, than by a column of water below inclosed in a cylinder. Standpipes vary, for the most part, from 50 to 120 feet in height, and from 11 to 39 feet in diameter, being exposed to maximum pressures of 82 to 130 pounds; while their average dimensions and pressures are, 63 feet high, 20 feet diameter, with a capacity of 150,000 gallons, an ordinary pressure in the distributing of 62 pounds per square inch. The tanks on the average have a height of 37 feet, a diameter of 21½ feet, a capacity of 100,000 gallons, and an elevation on a trestle or tower of 63½ feet. To obtain the average pressure of 62 pounds, the effective height of the standpipe or tank would require 142 feet, but generally advantage can be taken of some natural elevation in the neighborhood to reduce the actual height of the standpipe or tank.

THE acceptance of the proposed arbitration by the anthracite coal miners, at the Wilkesbarre, Pa., convention on the 21st, was followed by a general resumption of work in the collieries on the 23rd, and after two weeks it is expected that there will be the usual output and shipment of coal. President Roosevelt met the arbitration commission that he had selected at Washington, D. C., yesterday morning, and next week they will begin their deliberations. These men have a very difficult task. They will meet at various places as may suit the common convenience, take testimony of coal miners, and coal mine owners, and after due consideration of the evidence so presented will prepare a report to be submitted to President Roosevelt. All this will take considerable time. The first step and the most important and satisfactory one has been made, viz.: to secure consent of both sides to arbitration. It is now the interest of all—miners, owners and the general public—that the arbitration shall be a success, and it will probably be such, brought about by some concessions by and from both owners and employees. The outcome is the best that under circumstances could be looked for, and if the professional agitators and mischief makers can be ignored, the final result can be that the industrial disagreement of 1902 may merely pass into history as a great strike settled by the exercise of common sense.

COMPLAINT is made in some technical and trade journals, notably those devoted to electricity, that the present prosperity has a bad effect on the advance of the art, as every factory is so busy filling orders as to leave no time for experiment or improvement. It is argued by those who allege the cessation of electrical development that this is an evil attendant upon the present rush of business and that our European neighbors will devote their enforced leisure to improvements and developments that will eventually put them in the lead. There is a slight thread of truth in the assertion, but the American manufacturer in any line of applied science, whether electricity, mining or metallurgy, is scopy enough to fill the demand and at the same time keep up experimentation. With this it is just about as with a mine manager: no real manager will be content with extracting ore; he wants to do "dead work" or development work; he wants to explore as well as exploit, and constantly seek new ore bodies before those he now has are worked out. So with the manufacturer, who, while busy with orders, realizes, no matter how excellent the present standard

types of apparatus, that there is a constant advance in engineering, and that he must keep up experimenting with new ideas, new systems and new apparatus, that when the present is out of date he may not be out of business, but be able to keep up with the procession.

THE eleventh annual session of the California Miners' Association will be held in San Francisco November 17, 18, 19. The executive committee considers it wise to have the by-laws so amended that any member in good standing may consider himself a delegate and take part with voice and vote in the proceedings. It is also intended at the coming convention and future meetings that a part of the proceedings shall be the reading of articles by practical miners on practical mining subjects. It is thought that this will be of considerable interest and value, and that the resultant discussion will be of general aid. It is the common experience of every one who has ever taken part, that the discussion brought out by the reading of such a paper is often more interesting than the paper itself; hearing the ideas of one starts thought resulting in dissent or approval or additional data, to the end that there is augmentation of the common stock of knowledge on that subject. A case in point is illustrated by the excerpt on pages 234 and 235 from the proceedings of the recent San Francisco convention of the Pacific Coast Electrical Transmission Association. The reading of a paper on electricity as applied to mining brought out the discussion published in full on those pages, and certainly any one interested in the subject in any way will say that after reading the discussion he has had his stock of knowledge on that subject increased. This is just the idea regarding papers and articles for the ensuing miners' meeting; short, practical articles on practical subjects connected therewith and discussion thereof, the papers and the discussion by the men who do the things they write and talk about. In that way considerable valuable information can be secured, and the idea is commended to favorable attention. The California Miners' Association has done a great deal; much remains to be done; it deserves commendation for all it has done and tried to do, and deserves encouragement and co-operation in future work.

In the current installment of the "History of a Catalogue" on page 236 (which is being read by every mining machinery man in the country) the concluding sentence says an exceptionally good thing in the statement that "good business is in its greatest success for the largest good of all concerned." This is well said. No calling requires a greater use of brain power than business, and few require a higher order of general ability. The great secret of success in business—the secret, in fact, of success on a large scale—is to conceive of it as a matter of principles, not merely as a series of transactions. There are great merchants as there are great statesmen, and there are small merchants as there are small politicians, and the difference between the great and small men is much the same in both. The small politician works by the day, and sees only one opportunity before him; the small merchant does the same thing—he is looking for the next dollar. The statesman, on the other hand, is master of the situation, because he understands the general principles which control events. This knowledge enables him to deal with large questions and to shape the future. The great merchant does the same thing. His business is not a mere money-getting affair, not a mere matter of barter, but a science and an art. He studies the general laws of trade, watches the general condition of the country, investigates present needs, foresees future wants and adapts his business to the broad conditions of his time and place. He puts as much brains into his work as does the statesman, and he ends by being not a money-getter, but a large-minded and capable man. The more one understands life the more clearly he will see that it is all done on business principles, by which is meant that not only the universe is governed by unvarying laws, but that promptness, exactness, thoroughness and honesty are wrought in every fiber. On these business principles all life is conducted—if not by man, at least by that power which is behind man. It ought to be the ambition of every young man to treat his business from the point of view of the statesman, and not from that of the politician.

Concentrates.

THE duty on imported quicksilver is 7 cents per pound.

ABOUT 63% of the world's supply of gold has been taken from placer ground.

THE world's quicksilver production in 1901 was about 3331 metric tons—96,932 flasks.

A CORPORATION, a citizen, a woman or a minor may each make a valid mining location.

AT 5000 feet altitude an air compressor should be about 25% larger than at sea level.

A GALLON of refined petroleum weighs 6½ pounds; a gallon of crude petroleum about 7½ pounds.

ON steam vessels all boilers must be equipped with fusible plugs, made of brass and filled with Banca metal.

IN the Ural district, Russia, for 1901 was produced gold, 570 poods (2052 pounds); platinum, 380 poods (1368 pounds).

A CIRCULAR MIL is a circle 1000 inch in diameter. A wire 1 foot long and 1 circular mil cross-section is called a mil-foot.

WOOD can well be used for fuel in a reverberatory furnace, a deep firebox being required—from 12 to 16 feet length of hearth.

THE chief difference between granite and syenite is that the latter has scarcely any quartz and not usually more than 50% silica.

ASBESTOS is ordinarily found in serpentine. Geologically speaking, serpentine is decomposed granular intrusive rock, either peridotite or pyroxene.

FOR operating air drills, and for other ordinary mining purposes except ventilation, the working pressure is usually from 60 to 80 pounds per square inch.

THE addition of 8½ f. drachms, or 33 grams by weight of water, to each 500 grams crystallized carbonic acid will render it permanently liquid and ready for use.

WATER expands one-twelfth of its bulk in freezing, exerting a pressure of 30,000 pounds per square inch. Air is 813.67 times lighter than water at sea level.

ABOUT 100 miners' inches would be needed to run a hydraulic elevator with a 2-inch nozzle and a 150-foot head. That would be about 2½ cubic feet per second.

COBALTINE is found near Cisco, Placer county, Cal., a silvery white mineral with reddish tinge, occurring as impregnation in a mica schist, near the granite contact.

By zinc precipitation cyanidizers have calculated that one pound of zinc is consumed for each ounce of gold. Where charcoal is used the solution is constantly pure and clean.

THE deepest mine shaft in the United States is the Calumet & Hecla—4900 feet. The deepest hole drilled in the United States is the oil well of the Forest Oil Co., West Elizabeth, Allegheny county, Pa.—5575 feet.

MICA possesses the highest insulation resistance and the largest dielectric strength to be found. It requires 1000 volts to perforate a sheet 1 mil in thickness. Its chemical constitution is unaffected by high temperatures.

AN approximate way to determine the horse-power necessary to pump water to a given height is to multiply the total weight of water in pounds by the height in feet and divide by 16,500. This allows for water friction and steam loss.

BUTTE, MONTANA, copper mines at a depth of 1800 feet show a maximum temperature of 72° F.; Lake Superior copper mines at that depth, 50° F. "Concentrates" does not know of any Arizona copper mines attaining that depth.

THE Canadian Government pays a bounty of \$2.70 per ton on iron and steel manufactured in the Dominion from native ore and \$1.80 per ton from foreign ores, the bounties lessening each year. Last year those bounties amounted to \$351,259.

IF A asks B to sell goods to C on credit, A telling B that he (A) would pay for such goods if C didn't, A is not legally liable. Any actionable agreement would have to be in the shape of a suretyship, and in writing, properly signed and attested.

A pipe inserted in the top of a stack, leaving an annular space of 3 inches between itself and the inside of the stack, extending about 8 feet down into the stack and projecting 7 feet above it, is said to be an excellent and cheap device for preventing smoke and a saver of 10% of fuel.

WERE air exhausted from above the surface of the water the temperature could be raised to 275° F. before vaporization took place. When it did, the action would not be like ordinary ebullition under pressure of the atmosphere, but would be an instantaneous explosive.

IN electrolytic parting of gold and silver the alloy of the two metals constitutes the anode, and is placed in a linen bag. The cathode is a thin sheet of pure silver. The electrolyte is at first a 1% solution of nitric acid, which ultimately becomes a dilute solution of silver nitrate. With a current density of thirty-three amperes per foot, silver 99.5 per mil fine is deposited on the cathode in the form of crystals. These are mechanically scraped off and allowed to drop to the bottom of the cell.

Gold in the form of mud, containing some silver, collects in the anode bags. The silver is removed from it by dissolving in nitric acid, leaving the gold in a pure condition.

AN alloy that looks very much like gold can be made of copper 94 parts, antimony 6 parts, the latter added after the copper is melted; subsequently sufficient magnesium, carbonate and calcium can be added to make it weigh about the same as gold. The alloy can be hammered, soldered, and is practically unaffected by nitric acid.

THE assay-ton system of weights was devised by C. F. Chandler, of Columbia College. As there are 29,166.6 Troy ounces in one ton avoirdupois—2000 pounds—the assay ton contains 29,166.6 grams. Hence, if one assay ton of ore is taken for assay and the resulting button weighs ten milligrams, the assay value of the ore is ten ounces per ton.

THERE are frequent requests for back numbers of this paper published in the '70s, '80s and '90s. The charge for such copies is 5 cents each in addition to the regular 10 cents charged for the current issue, for each year back. For instance, a copy is wanted say of the issue of July 9, 1893. It would cost 30 cents. A copy of the issue of April 21, 1894, would cost 50 cents, and so on.

DISTILLATE OIL carries 2% asphaltum and 98% liquid. Crude oil carries 45% asphaltum and 55% liquid; about the same as if one bought soft coal—some of it is dust which will not burn, but will fall through into the ash-box. It is the same with crude oil—the asphaltum will not burn, only makes smoke. The law requires that upon steamships no higher gravity be used than 16-18.

"TECHNICAL TERMS" are used herein as little as possible, but can not be wholly dispensed with. A "technical term" that may have no meaning to one conveys exact information and expression to another and is unavoidable in any article treating on any special subject. A "technical term" is synonymous with an exact term, a word or phrase specially or exclusively pertaining to some particular trade, profession or pursuit, and one that could not be exactly replaced by any other.

FOR coating aluminum with other metals use the following electrolytic solutions: For silver, 20 grams of nitrate of silver, 40 grams of cyanide of potassium, 40 grams of phosphate of soda, 1000 grams of water; copper, 300 grams cyanide of copper, 450 grams cyanide of potassium, 450 grams phosphate of soda, 5000 grams of water; nickel, 70 grams phosphate of soda, 70 grams chloride of nickel, 1000 grams of water. The anodes are of the same metal as that in solution, and the bath is kept at 140° to 158° F.

ONE cubic foot of air compressed adiabatically from 14.7 pounds per square inch (60° F.) to 74.7 pounds absolute results in a temperature of about 365° F., and the mass of air will occupy .314 cubic foot. It may be stated generally that for pressure above 70 to 80 pounds per square inch it is advisable to compress in two stages—that is, the air at atmospheric pressure is drawn in and compressed to an intermediate pressure in the first cylinder, and from this it passes to the second cylinder, where it is compressed to the final or working pressure.

GALENITE and other lead ores are the source of much silver, which alloys with the metallic lead after roasting. Pattinson's process for the separation of the two metals depends upon their difference in crystallizing. Just before the molten alloy solidifies, crystals of almost pure lead occur in the mixture. These are dipped out by means of a sieve-like ladle. By the repetition of this, almost all the lead is removed, leaving a rich silver product. This is heated in appropriate vessels in contact with the air, when the remaining lead is oxidized, leaving metallic silver.

IN a 5-stamp battery each 1350-pound stamp dropping 100 times per minute would require 2½ H. P.; each 900-pound stamp at the same drop rate, 2 H. P.; each 750-pound stamp, 1½ H. P. Boiler feed for each horse power per hour would average five gallons water. 1, 5, 2, 4, 3 is good drop arrangement, No. 1 sending the water through the battery lengthwise, which No. 5 in falling catches and throws back, the same with No. 2, sending it back to No. 4 in its descent, No. 3 equalizing the swash. 3, 5, 1, 4, 2 is the succession most frequently adopted in California.

FRAUDULENT and BLACKMAILING SCHEMES of Eastern "investment," "financial" and "mining" journals have been exposed enough to place people on their guard, and in a paper like this such exposure needs no repetition, as our readers are not of a class liable to be bunked by those sharpers. No inconsiderable part of the mail received in this office is letters asking the opinion of the editor as to the worth or unworth of certain statements, letters sometimes prompted by the swindlers themselves in hopes of securing notoriety by suits for libel against this paper.

PROSPECTS have often been developed into mines by miners who have operated on the claims under lease, the work being done by men who have made a life study of it and who know more about the practical side of the business than the average board of directors. For a company with no money, or only unmarketable stock, the leasing system is a good method to pursue. The lessees are the only ones who make any outlay. If they strike it, the company receives royalties on all ores shipped by them until the termination of the lease, and at the end of it have a good showing. Lessees are good judges and

are not inclined to waste money and labor on territory which is no good. Anyhow, there is some chance of finding pay ore in a property that is being worked, but none where a claim lies idle.

BISMUTH is precipitated quantitatively and in a compact form on a wire gauze electrode, provided that the current density does not exceed 0.5 ampere per 100 square cm., or 0.1 ampere per 100 square cm. for a solution containing 0.05 gram per 100 c. c. The best method is to dissolve the metal or compound in enough nitric acid to prevent the separation of basic salts on dilution to 100 c. c. to electrolyze with an E. M. F. of only two volts from a battery of accumulator in parallel, and to start the electrolysis at 70° to 80°, allowing the solution to cool gradually so as to automatically reduce current density as the solution becomes more dilute. The method does not suffice to separate bismuth and lead, for the lead peroxide which starts the anode always contains bismuth. The maximum error recorded for solutions of pure bismuth is 0.0005 gram on 0.01 gram of bismuth.

IT is sometimes hard to understand why structural steel and other materials suddenly break under a load far below that which it is rated to carry and even has carried. In the majority of cases it will be found that a metal suddenly breaking in this manner has been subjected to a series of violent vibrations similar to those received by a car wheel. These vibrations disturb and destroy the crystalline form and arrangement of the metallic particles, assumed when cooling or under special treatments. But when this crystalline structure is destroyed the metal no longer possesses its former strength. This will happen to almost any metal in state of vibration, no matter what the care taken in its preparation. Consequently, all structures should be guarded from successive vibrations; but if this is impossible, the material should be many times stronger than the load theoretically requires.

SODIUM is manufactured on a commercial scale at Niagara by the electrolysis of fused caustic soda. The electrolyte is maintained in a fused condition by the current which passes through it. An iron containing vessel constitutes the cathode and the anode consists of rods which dip into the electrolyte. The sodium after deposition rises to the top of the electrolyte and floats upon its surface. As it accumulates it is removed by small iron dippers. The sodium, after its reduction, is used in the manufacture of sodium oxide. This is done by spreading the metallic sodium on trays, which are placed in tubes, that are supplied with air, dried over calcium chloride. The sodium peroxide is then used for producing peroxide of hydrogen. For this purpose it is mixed with sulphuric acid, and during the mixture the temperature is maintained near zero by melting ice. This is necessary because of the unstable character of the peroxide of hydrogen.

THE effect of cold is to stop the setting of cement. Most cements set very slowly, if at all, below 32° F. When the temperature is raised the cement sets, unless in the meantime the water has evaporated sufficiently to leave an insufficient quantity for the chemical action, so that the freezing of work laid in cement mortar usually has the effect simply of delaying the hardening of the mass. If too much water is used in the mortar, the expansion of the water in freezing may disintegrate the mortar by mechanical action of the ice in forming. Alternate freezing and thawing increases the danger of injury. Portland cement is seldom injured by freezing, but many natural cements are more or less injured, and mortar of natural cement is liable to disintegrate even under the best of conditions, if the temperature is long enough or often enough below the freezing point before it has had an opportunity to set. One method of aiding the setting of mortar is to delay the time of reaching the freezing point by heating the stone or brick, the sand, the cement and the water. Freezing may also be delayed by covering the work with straw or tarpaulins. The most common preventive is a solution of common salt for mixing. Add 1% of salt to the water for every degree of temperature below freezing.

IN the Black Hills, South Dakota, district in the principal gold mills two kinds of single discharge mortars are used, each consisting of one solid casting, the bottom and sides so thick as not to need any lining, thickness decreasing as the feed is approached; outside walls vertical, with the exception of the discharge, which projects. The top is closed by two pieces of 2-inch plank, which rests on lugs ¾-inch wide, cast in the mortar, 2 inches below the top. These planks have each five semi-circular recesses which, when placed together, form holes for the passage of the stems. In addition to these five large holes, two smaller ones are bored for the 1-inch water-supply pipes, placed between stamps 1 and 2 and 4 and 5. Two mortars are placed close together, as the stamps of both are set in motion by one cam shaft. To reach the mortars, etc., a passageway is left between every two pairs of batteries. The water supply is derived from a 3-inch main, running along the front of the batteries. From it passes upward a 2-inch pipe between each pair of batteries. With this is connected a 2-inch horizontal pipe, from which four 1-inch pipes branch off at right angles, two for each mortar. In addition to this water supply, there is a 1-inch pipe at each passageway, close to the mortar, coming from 3-inch main. A hose is attached to clean the apron plates, and for other purposes. The points of difference between the two mortars lie in the inside dimensions of the lower part of the mortar and in the arrangement and number of the inside amalgamated copper plates.

Electricity in Mine Operations.

Considerable notice has already been made of the papers read and the work done at the recent sixth annual convention of the Pacific Coast Electric Transmission Association. In addition the following from the current issue of the Journal of Electricity, Power and Gas is given place because of its interest to mine superintendents everywhere. It is a kind of matter that can not be well condensed or abridged. As will be noted, it is a verbatim report of an oral discussion by members of that association, and apart from the technical part of it, there is a good deal of comment and opinion on subjects of considerable importance to every mine worker in connection with the ever-present question of power.

On the afternoon of the second day of the convention the secretary had read a paper by Mr. Hall on "The Application of Electricity on the Comstock Lode,"* when the following discussion ensued:

The President: This paper is very able and interesting, and is of great value to us. You will have perceived that without any suggestion from me. You have always refused to take any power of this sort, especially a mine hoist, because of the jerking of the voltage and the injury to the lighting system; but there are hints in this paper that encourage me to believe that such a thing will be possible for us in the future. We want to have a full discussion of this paper, and you can give to it all the time that you care to devote to it.

Mr. Fry: The real reason that the mining operation has to be so steady is because of the concentrators. Stamps don't matter quite so much. How is the Comstock? Are concentrators a very important factor in the mill operations?

Mr. Hall: We have nine Frue vanners in operation upon the same circuit with the hoists, and no trouble has been experienced therewith. The motors are not overloaded, and it takes considerable of a drop in voltage to lessen the speed perceptibly.

Mr. Fry: We find a variable load in Amador; even 1% they object to—not on account of the stamps, but on account of the concentrators; but if the regulation can keep within 1% there is no objection; but if it gets much worse than that they are heard from at once. There is one question I would like to ask Mr. Hall, and that is about the location of the fans in the mine. Are they on the surface?

Mr. Hall: The fans are all located in the mine, just as close to the work as possible. We have natural ventilation throughout the mine workings, and the fans drive the air from these to the working faces.

Mr. Fry: The fans about Amador and Calaveras are usually located on the surface. They have a unique method there of changing them from an exhaust to a blower. They have a combination of gates whereby they can reverse the current of air, and this gives cool air down the shaft for a majority of the time, and just after blasting they change the blower into a suction and so exhaust all the gases and powder smoke.

Mr. Hall: That is the same method I have adopted in the Hale & Norcross tunnel.

Mr. Fry: I would like to know about the two-minute peak. Is that recorded on recording voltmeters?

Mr. Hall: It is not recorded at all. We can't record it.

The President: If there are any further questions to be asked of Mr. Hall I suggest that they be asked now, and then I will have the other papers read, and then we will have the general discussion of the whole matter of electrical hoisting. Are there any further questions to propound to Mr. Hall? If not, we will listen to the reading of a paper by Mr. Poole on "The Economy of Electrical Power in Quartz Mining."†

Mr. Fry: Mr. Poole, in quoting Mr. Tregloan's article, stated that the power cost \$270; that is for two months; so it is really half of what Mr. Poole said, which is a sixty-day test. I don't know whether he made a mistake or not. It is not very clear in the article in the MINING AND SCIENTIFIC PRESS.

The President: Are there any interrogations? If not, before the general discussion, we will listen to the reading of the third paper, by Mr. Fry, on "Electric Pumping From a 1300-Foot Level."

Mr. Fry: Mr. Hall is talking about the amount of water lifted. They have three pumps. Couldn't they attend to your work very handily? Two of the three that you have installed, and handle the water?

Mr. Hall: About the same. Two of the three pumps installed will handle the mine water alone, about 300 gallons per minute.

Mr. Fry: There they don't need the reserve capacity. In some mines in El Dorado, pumpmen tell me, they are up to their waists in water trying to get the pump going, crawling up one hutton at a time. They can't get them in perfect condition. They get down a little ways, but they can never get

the pump going perfectly. If they can't put in a large pump, or several pumps, or have water skips to help them out, they are in a bad way. They want large pumps, or pump large enough to run only part of the time.

Mr. Stark: What means have they in case of emergency of getting the pump or the water out of the sump, if the necessity should arise?

Mr. Fry: The pump is on the 1300-foot level, in a place as dry as this room. The shaft is particularly wet. It would make you gag for breath to go down it; but the pump is 30 or 40 feet away from the shaft, in a dry place. Most of the water is caught up above that section. The sump is on the 2000-foot level. They would have to fill that mine up before it would drown it. If they put another pump at the sump they don't have to look out for it.

Mr. Stark: In locating a pump in a mine it has been the practice, particularly at Brown's Valley, to have it located at a lower level, whereas, in my opinion, they could have located a smaller pump at half the height and have saved three-fourths of the lift of the water; that is, in that particular shaft, most of their water is from a higher level, which is about 300 feet below, and they have located the pump at the 700-foot level. In that way, it strikes me, that some thought could have been put on it, and put in two pumps, and save in the installation in the first place.

Mr. Robert McF. Dohle: With reference to the Oneida, there are no workings practically above the 1300-foot level.

Mr. Stark: Where does the water come from?

Mr. Dohle: It works through.

Mr. Stark: Do you put in dams?

Mr. Dohle: There are no workings in that part of the mine. I noticed some literature the other day on this same question of pumps in mines. The pumps and motors are placed in steel casings, absolutely water tight, and are arranged so that even if the mine floods, the pumps and motors will not be wet; and they provide an air pressure from the compressor with the casing and prevent any leakage of water within, or any collapsing of the casing. Some blueprints were sent to me a few days ago showing that application of electric pumps in deep mining, which might be a good arrangement in works of that kind.

Mr. Fry: In and about Amador the mines are not very wet. Every vertical shaft is wet. We had rather a nasty experience splicing a cable 600 feet down, where it was raining pretty hard, and we had to keep it dry, and built a canvas house down there. But in that section I don't think they will ever have it flooded. Of course, it would be a good idea to house it in on the sump at the 2000-foot level, if they ever put in a pump down there, because there it might get wet; but as the mine is not a very wet one, as they can hoist 800 gallons at a skip, I don't think they need fear any trouble in that particular mine.

The President: For the general discussion we have had three exceedingly able and lucid papers, of great interest, doubtless, to many who are present. The views are somewhat divergent; there is opportunity here for discussion. We will be very glad to have you not simply criticize the paper, but also to discuss the general subject of hoists and the proper apparatus to work them.

Mr. Eastwood: I should like to ask a question; that is, why electric power has to be so heavily handicapped in order to get into use in these mines?

The President: It takes people some time to find out things.

Mr. Fry: I think that is because a good many mining superintendents are old men, and not used to that class of work. As the young men come up they won't have the same prejudice to huck against. You will find the younger superintendents taking to electric power a great deal quicker than some old men. I think it is a personal equation.

Mr. Lighthipe: I would like to ask Mr. Poole, in comparison with compressed air and the direct application, whether he has made the comparison by kilowatt hours. Assuming that both were buying on the meter, whether it would pay to use compressed air or electricity for hoisting. I would like to see the comparison made. He has gone into details against the use of oil and wood and coal, but I would like to see the amount of work done; the comparison with the amount of work done between the direct application of electric power and of compressed air.

Mr. Poole: I have prepared a few figures that touch upon this subject, and they work out something like this: 2375 British thermal units imparted to a pound of air will raise it 1° F. One pound of oil having 18,000 British thermal units, with a heater efficiency of 50%, will give 9000 heat units to the air— $9000 \div 2375 = 37,895$ pounds of air raised 1° F.

If we raise the temperature from 60° F. to 360° F. it will be increasing the temperature 300°. One pound of free air at 360° occupies 20.63 cubic feet, while at 60° the volume is but 13 cubic feet; this represents an increase in volume of 58%. If we divide 37,895 pounds by 300 we get 126, which represents the pounds of air that has been raised from 60° to 360°, and 58% of this represents the actual gain by reheating, which is 92.8. $13 \times 92.8 = 1206$, which represents the cubic feet of free air reheated to 360° by one pound of oil. Assuming the air engine to consume twelve pounds of free air per minute

horse power, then the horse power hours will be $\frac{1206}{12 \times 60} = 1.67$.

Oil at \$1.50 per barrel will make the cost per horse power hour \$0.00269.

Electric power at \$6.50 per horse power per month equals \$0.009 per horse power hour. Assuming the combined efficiency of electric motor and compressor to be 50%, then the cost per horse power hour delivered by the compressor will be \$0.018. Reheating this horse power of air with a pound of oil, at a cost of \$0.0045, increases the horse power to 2.67, at a total cost of \$0.018 + \$0.0045 = \$0.0225—the combined price per horse power hour = $\frac{.0225}{2.67} = \$0.0084$,

showing a little more than 100% efficiency. From these figures it appears that compressed air can be delivered to the air motor at the same price per horse power that is paid for electric power delivered to the electric motor driving the air compressor. That is like lifting yourself over the fence by your own hootstraps, but it figures up all right, and I think it can be demonstrated. These figures show more than 100% efficiency of the actual power delivered to the motor driving the compressor. While that cannot be realized in actual practice, we can easily figure on 75% of the actual power delivered. At that rate it would cost $1\frac{1}{2}$ cent per kilowatt hour delivered to the motor.

Mr. Lighthipe: I am assuming that in a certain part of the country the fuel bill is enormous, and I am assuming that electric power is available. If we use compressed air, can we reheat our air electrically with any economy?

Mr. Poole: Heating and cooking by electricity have always been considered a luxury, and while the efficiency shows up very high theoretically, in practice I don't know of any way of applying it to compare favorably with fuel oil at \$1.50 per barrel. I have not gone into figures on the subject, but taking what I have heard it is not practicable to do it against those prices for fuel.

Mr. Lighthipe: I don't want to assume oil at \$1.50 per barrel, because in certain parts of the State you can't buy oil at \$10 a barrel. Take, for instance, the Four Hills mine, where they have abundance of electric power, they would have to carry oil on the backs of mules 10 miles. I don't suppose they could get a tank of oil up there. We made little coils for them to use to keep the exhaust from their air operated pumps from freezing. The coils consumed 200 or 300 watts, and they kept the exhaust perfectly warm, so that it would not clog up. The question came up at that time, would it pay under those conditions, where the current is very cheap and fuel very high, to attempt to reheat our air electrically?

Mr. Poole: I should say, under those conditions, it can be done and done economically. Of course, when I stated that it was not economical to do it, I stated that on the basis of fuel oil at \$1.50 per barrel. The ideal way to reheat air would be to put your reheating device right into circuit with the air just before the air enters the air motors. An electric heating device applied in this way would prove very satisfactory.

Mr. Hutton: I would like to ask Mr. Poole if the compression he speaks of is a double stage compression.

Mr. Poole: The computation that I have just recited does not make a two-stage compression; it is a single stage compression.

Mr. Hutton: What pressure?

Mr. Poole: Eighty pounds.

Mr. Hutton: How much better results can be obtained from two-stage compression?

Mr. Poole: Better results by 15% would be obtained by a properly arranged intercooler and two-stage compression.

Mr. W. A. Dohle: In installing a compressed air plant for maximum efficiency the air should not be cooled in the compressor, but the compressor should be lagged the same as a steam engine. The pipes should be covered and the heat maintained, which is caused by the compression, and not thrown away, as the most serious loss in compression is the heat that you squeeze out of the air, in other words. By taking air and getting it hot and keeping it hot, you will secure all of the advantages without the reheating process; because in the arrangement you speak of there would be no reason why the compressor and receivers and the hoisting engine should not be close to each other, and no long pipes be necessary in which cooling could take place. Air handled in that way gives a decided advantage, because you save what otherwise becomes a loss of compression. If you take compression up to a point much greater than 100 pounds then your internal temperatures would become great, and it would be difficult to lubricate your surfaces. But going to the problem of hoisting in mines electrically: I was over in Colorado the other day, and they are hoisting electrically there very satisfactorily with a 300-volt direct current and with rheostat control; but they are using their skips counter-balanced, so that the motor has to work whether it is hoisting or lowering, and in that way they are getting a very satisfactory current consumption per ton of ore hoisted by having it over-balanced, so that the motor works when it is lowering, and it is hoisting counter-balanced. It is the

* MINING AND SCIENTIFIC PRESS, pages 111, 115, 116, Aug. 30, 1902.

† MINING AND SCIENTIFIC PRESS, page 231, April 29, 1902.

same scheme as used in passenger elevators. Another point which occurs to me on this electric mine hoisting is this, the mining companies have not been willing to install or to invest sufficient money to put in a suitable electric hoist. They are accustomed to buying boilers, brickwork, smoke pipes and steam hoist, and they don't look at that; that is a necessary evil, and when you ask a mining company to pay a few thousand dollars for a suitable electric hoist, they are not inclined to do so. Of course, in all engineering processes, it is pretty safe to start in on the most direct course, because it is safe to assume that any transformation or any changes that we take up are bound to cost us something in heat units to overcome them. I speak particularly with reference to the variable voltage control in hoisting, such as the Ward Leonard or some of the other systems that are now in use, and with a properly installed direct electrical hoist, using a variable voltage system, the efficiency of the operating mechanism is then brought up to the efficiency of high-class electrical apparatus, which brings it much above the possible efficiency of a compressed air plant. This system has not been used in any mine hoist on the coast, except in one small installation, but it has been used in the East on duties which are even more severe, like in the handling of rolling tables in rolling mills. I think we can build a plant, designed properly, and that with the use of the variable voltages the control of the mine hoist can be handled with absolute satisfaction. Of course, that requires, taking it from an alternate current transmission, first an induction or synchronous motor driving a direct-current generator. Then there would be a direct-current motor attached to the hoist, so that it requires two additional electrical units, or pieces of electrical apparatus, so that the horse power of apparatus installed would be practically 3 to 1. But the results secured are very satisfactory, because the current consumption is practically in proportion to the load handled, and the apparatus is exceedingly simple. Of course, there is another very satisfactory way, though not as good, and that is by using a series parallel controlling apparatus, such as is used on street cars, which gives fairly good results. There is one advantage in using the compressor, and that is when your hoisting engine and boilers are on the ground; but ordinarily the hoisting engine is so inefficient that it would very much exceed the steam consumption that you mention, namely, approximately about thirty pounds. It is a very excellent steam hoist that will anywhere near approximate that. Then when you take into consideration the leakages that come into the compressors and engines of that type after they have been used, the steam consumption or air consumption materially increases, whereas by taking the same cost of investment and putting in a direct electrical apparatus, or, perhaps, even a lesser cost of investment, the results would check out, I believe, fully as satisfactory, or more so, besides having a simple plant instead of a composite one. The plant I speak of was tested on the Gottschalk mine. That was on the Ward Leonard system, taken off the California Exploration Co.'s lines. I watched that ammeter while it was running, and the current consumption was almost absolutely in proportion to the work done, without any sudden rise in current consumption in starting the load.

Mr. Fry: In regard to that I don't see where the advantage would be over the system that Mr. Hall spoke of. There is three times the outlay and three times the risk of breakdown, and practically the same variable load—not quite as variable, but very nearly, as the variation in the load as in the altering device; and I don't see just where the advantage would come in. Another point is, that you not only increase your first cost of machinery three times, but you multiply your inefficiency. If you get 90% of one, two a little over 80, and three is in the 70's.

I would like to speak about reheating the air. I think it is necessary to cool the air in a compressor. You cannot get too much receiver capacity. To insulate all that heat, and to insulate down into the mine shaft, I think it would be out of question in the first cost. So few of them realize what the receiver capacity amounts to. South Spring Hill is a small receiver capacity, to be sure, but it was large compared to the motor, and the saving there was exceedingly great. Of course, that case was a particular one, and it was well worked out by Mr. Tregloan, and fit the circumstances exactly. They saved \$70 a month over and above the cost of the electric power; in fact, over \$2 a day saved on the installation, and they were able to hoist three times the amount of rock with the same amount of labor, and the expenses were \$70 less. It was merely a test, but the conditions were very unfavorable. It was an old type machine, taken out of a junk pile, you might say, and the conditions were anything but favorable. They did not have time to put the air piping into the hoilers in perfect condition, but blew it in on top of the water; but at the same time there was a saving, and in that case it was a very nice installation; but a large mine would need an exceedingly larger receiving capacity. You don't all realize that, because the moment you are using air a little faster than you are producing it, then you use more—you multiply it and it runs right away from you. We had a 30 H. P. motor, siphoned the water out of

the tunnel, and she couldn't hold up; she would average about 26 H. P. night and day, and couldn't satisfactorily operate the one drill; it would get away from us. That same 30 H. P. motor, running a compressor a little smaller, and using on the average 21 H. P. night and day, wouldn't run two drills, and the extra air went into the boilers and practically did all the hoisting through the day time. So the compressor was shut down, and Mr. Tregloan understood the situation very well and got in receiver capacity enough. Fortunately, he had it right there. So many mines put in ten times the compressor power—put it all in compressor and don't have anything in storage—and the hoist is variable. When she stops you are loading up your receiver, and, if you have not receiver capacity enough, she gets away from you, and you can't catch up again.

Mr. Lighthipe: Speaking about the direct application of direct current, Mr. Stark may tell us about several hoists in Grass Valley. I know of two that were installed there in series parallel, the power coming from a synchronous motor coupled to a direct-current generator, the direct-current generator supplying the current for a series parallel hoist. I know of one, especially, in the Gold Hill mine there, for which we made a very easy hoist—a very easy start, by putting in resistance in the field of the generator—a 500-volt generator—and we pulled it down to somewhere in the neighborhood of 200 volts. This generator was heavily over-compounded, and in throwing on the series parallel hoist we started with a voltage of about 200 volts, and the machine compounded itself as the load came on and made a very smooth acceleration. Of course, the hughoo in all hoisting work is the acceleration of the heavy mass, the same as in street-car work, and any method, such as the Ward Leonard system that Mr. Dohle spoke of, that will take off this high peak in starting, is a great benefit both to the consumer and to the company that furnishes the power. There were several of these hoists, I think, installed in Grass Valley before we had properly developed a good variable speed induction motor. At that time the variable speed controller had not reached the place it had when Mr. Hall had charge of the Comstock installation, but it filled the requirements in several hoists. Of course, it complicated the apparatus, but I think if any tests were made it would show good economy. The series parallel controller for hoist work has been very ably experimented on in the Dunsmuir hoist. The first three hoists established there were made of a regular railway type of motor, with a rheostat control. The additional hoists were made with the series parallel control, and the watts per ton lifted from the hold of the vessel was just about one-half with the series parallel controller as it was with the resistance type. Of course, the lift is very short. It is the acceleration. Before you are through accelerating you are breaking, and, in fact, a great deal of our mine work is that way unless we have a long lift; we don't fully get up speed before we begin to slow down again, and anything in the way of hoist work, in direct application, we have to set at variable speed that shows some economy.

Mr. Poole: Referring to Mr. Dohle's remark in reference to the compression of air in a compressor, his ideas are all right if you can use the air as soon as it is compressed, with this exception: that when you compress your hot air and keep it hot you increase the power required for compression.

Mr. W. A. Doble: The fact is that compressors are being run compressing up to a pressure as high as eighty pounds, and higher than that, and running without any cooling whatsoever. I did not quite understand Mr. Fry's remarks as to conveying this air down into mines for any great length of pipe, or keeping that free from cooling, because, as I understood, we were discussing the question of mine hoists where the compressors and receivers could be close to the hoisting engine. If you are running with steam you lag your pipes and lag your drums, and all to keep them hot, and I see no reason why, if you are running with compressed air, you could not preserve the heat that you necessarily develop in it in the process of compression much better than to throw it away, even though your oil only costs you 1% or 2%; you save that much, and it seems to me no huge difficulty. We do a great deal in the compressed air business, and I see no difficulty whatever in keeping the air hot, and with properly lagged receivers, which are very simple, it makes that much economy. It is being done in some places. The air is being compressed and the initial heat is maintained. Of course, for underground working, I don't believe that any air pump will equal the results secured from an electric pump. We have had enough experience with that to get very satisfactory tests from it, such as Mr. Fry mentions in the Oneida. Mr. Lighthipe will remember the old Gover plant; that was the first electric pumping plant, as far as I know, ever installed; it ran right along with exceedingly favorable results, and the cost of maintenance was very low. In fact, I tested the pumps at one time, and the current delivered to the motor was a little better than 75% of the theoretical power required to lift the water on a 500-foot single lift.

Mr. Poole: I don't want to pose as antagonistic to electric power for any purposes, but I do advocate that in the ordinary mining, as it is carried on today, especially with installations already installed,

compressed air for hoisting purposes, to my mind, is superior to electrically-driven hoists. The efficiency, I think, can be made fully as well by proper reheating and proper looking after the compressors and your hoists. I do believe, though, that the hoists should be somewhat reconstructed to get the best results. But the net results, I think, can be just as efficiently obtained by using reheated air and electrically driven compressors. The reliability is a very important factor, and when you talk to an old mining man about putting in electric hoists he is very skeptical. If he is away off somewhere where he can not get anything but electric power, he will take it, but it is only as a last resort. He will take almost anything else before he will take electric power for hoisting purposes.

Mr. Stark: As to the question of running hoists, and hoists only, I will go into the details of the plant that Mr. Lighthipe spoke of. That is similar to the Ward Leonard automatic arrangement entirely. The voltage on the direct-current generator that is driven by a synchronous motor—it is at the Gold Hill mine. The generator voltage is lower; the machine is somewhere about 10% or 25% over-compound. The control is with two motors, multiple series, and, as it starts in series, the current is low and the compound is slight, and hence the hoisting effect of that on the compounding makes a very slight draft on the alternating current synchronous motor. As the speed increases, by cutting out your resistance the compound increases, your voltage increases and the speed of your hoist; the whole thing is beautifully automatic, and is not an infringement at all on the Ward Leonard scheme, and acts just as well.

Mr. W. A. Doble: There is one thing I would like to speak about, and that is that receivers out of proportion to the size of the compressor make a serious drag on the system, that when your work is heavy you have a low pressure in your receivers, and your compressor has to have double work to catch up. That was found out at the Eagle-Shawmut mine, where they use a great deal of compressed air. They found that after they increased their receivers over a certain size in certain portions of their work, the receivers became a detriment. It is just the same as they found out in rolling mill engines, as to the effect of the flywheel, that in rolling very long rails the flywheel is of disadvantage, because as soon as it lost its inertia it became a drag on the engine. The receiver, if it is overproportioned, has the same effect. It becomes a drag on your compressor; at the Eagle-Shawmut they propose to now put in an automatic device, which is more on the principle of a hydraulic accumulator, where the receivers will be connected up to a column of water, and, so as the air is used out, the pressure in the receivers will be kept constant, and, as the air accumulates, it simply drives the water back up the hill, having the same value as an ordinary accumulator in hydraulic practice, otherwise as soon as the receivers begin to lose pressure they become a drag on your system.

Mr. Fry: Very few mining superintendents put in too much receiver capacity. I think that might be overcome by a check valve.

Mr. Doble: You lose your pressure in the receiver. If you have something that will maintain that pressure and give you the last air in the receiver at full pressure, you then use your entire receiver capacity to advantage; they are accomplishing it there by running a water pipe up the mountain, and with that they get a constant pressure on the air, no matter how little air they have in the receiver. Otherwise you draw on your receiver; the air is of such low pressure it is of no value and becomes a drag on the compressor.

Mr. Poole: It seems to me that would be evidence of not having receiver capacity enough. If you have no range in working pressure the receiver is of no use whatever. If you have a range in the pressure—that is, working range—of course the receiver is useful so far as they will keep within that range, and to that extent only.

Mr. Doble: But a receiver will hold a great many cubic feet of air, say, forty pounds, which would be too low to be of any value, whereas if that receiver is drawn down half way, if they could still maintain the pressure, which they do by water, then the full receiver capacity would be available.

Mr. Lighthipe: Wouldn't it be cheaper to use an accumulator, as is done with water elevators?

Mr. Doble: Except the capacity may be limited; and friction and leakage would be a serious item.

Mr. Poole: I would like to ask Mr. Hall with reference to the measurement of their electric current used on the hoist. Did I understand it was by ampere-hour meter?

Mr. Hall: At the present time there is no measurement taken at all. The contract is that we buy 1000 H. P., whether we use it or not. Our consumption is less than 1000 H. P., and there is no measurement taken. The electric current is supposed to be measured on a recording voltmeter, which would indicate the two-minute peak load. Up to this time we have not been able to get an instrument that will do that.

Mr. Poole: Will it be a wattmeter?

Mr. Hall: Yes, a recording wattmeter. In addition to that I have put integrating wattmeters at each installation, and from these I propose to divide up

the consumption of power between the various companies.

Mr. Lighthipe: About four or five years ago I tried to get the General Electric Company and the Union Iron Works to build a hoist, using an induction motor on which the rotor and stator, as Prof. S. P. Thompson calls them, revolved in opposite directions, the taunts being equal and the speeds being equal; then both sides would belt on to a shaft with a bevel gear, after the style of the old Pelton differential governor. Both revolving at the same speed, the bevel gear would stand still—that is, the journal in which the bevel gear rested would stand still. This was connected directly to the hoist shaft. Then, by breaking either the rotor or the stator of the induction motor, you could gradually accelerate the hoist in either direction. But nobody enthused over it, and we dropped it.

Cumal Property in Sonora, Mexico.

In the last three years great prominence has been given northern Sonora. Under date of the 9th inst.,

shares are owned principally by Oakland and Los Angeles men, and the capital to properly explore and exploit these surface croppings is to be California money.

"The four cuts show prominent places on the surface of this property, and the cut No. 1 is said to be the greatest surface showing of profitable ore on the American continent.

"A recent discovery of extensive and rich placers on the 'La Angostura' group adds to the value of the Cumal Co.'s holdings."

The property is 70 miles south of Tucson, Arizona.

The History of a Catalogue.

NUMBER III.

Written for the MINING AND SCIENTIFIC PRESS by CHAS. H. FITCH.

As I pass along the streets of the "Loop district" of Chicago few signs greet my attention more frequently than this: "Wanted, a Gordon Feeder."

The patience of Job Printing has a counterpart in the

hunger of this Gordon for whom it is so difficult to hire feeders. The operation of feeding paper to the Gordon, a press with a round platen, seems to be quite a simple one. I see boys getting \$9 a week placing sheets of paper for the Gordon press, and others a little older getting \$13 a week on the larger cylinder presses, some of which run by electrical power. And from the frequently posted notices feeders would seem to be in good demand. The presswork is one of the most interesting and expensive contributions to the catalogue, and I always think leniently even of catalogues which are conceived in vanity and issued in uselessness, knowing that they help the boys and maintain the trade appetite for Gordon feeders.

The paper stock also figures out quite a considerable item. But if I have the work plated, or electrotyped, so that no composition is necessary, I nearly cut the cost of the catalogue in two. Large editions divide this cost over a greater number of catalogues, and in figuring composition as half the cost I had in mind editions of 3000 to 5000.

One of my sage superiors at the great works somewhere gave orders to economize in the publication of catalogues by issuing editions of 1000 instead of editions of 5000. To this I demurred and produced figures to prove that it would be more

expensive to issue editions of 1000 at a time than to issue editions of 5000 and throw 2000 away. And I am free to confess that in our manner of handling and distribution we pretty nearly did this very last thing.

single average shop, which on an expenditure of about \$4000 a year would amount to about \$1000. But the effect on quality and uniformity of work was not calculated to arouse enthusiasm, and if any one said our catalogues were fine he was immediately suspected of being a millman out of a job or some one with an axe to grind.

Another economical measure was the use of page plates. Expense for plating at 40 cents a page applying to a second edition is against \$1.75 for composition on the first edition. Subsequent editions up to 30,000 or 40,000 copies were figured as costing nothing for composition. The result was that issues that cost us \$3000 would have cost \$5000 or \$6000 if set up anew every issue. Still, the plates would get battered; perhaps the typesetters would rough it to them in the interest of business, but the roughest treatment they had was on account of our own disposition to change things. Small changes were made by plugging the plates at 15 cents a plug. Larger changes obliged us to reset pages, in which type of slightly different style was used, and the final effect was not typographically elegant.

On this system, in the year 1896, the number of



Surface Showing of Copper Ore, Cumal Mines & Development Co.

J. D. Burgess, consulting engineer the Cumal Mines & Development Co., sends some photographs of the company's property and says:

"The Cumal Mines & Development Co.'s property is about 18 miles southwest of Nogales, in So-



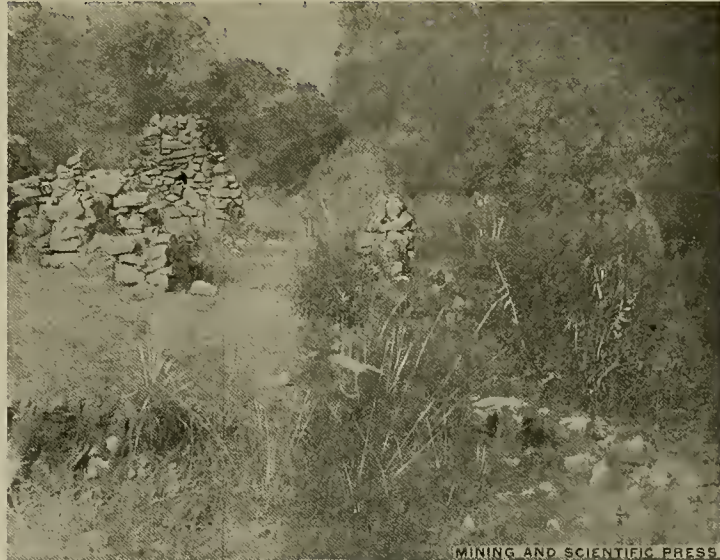
Croppings of Ore, Cumal Mines & Development Co.

catalogues issued figured out exactly 100,000, ranging from 8 to 184 pages each. The cost was only \$2000 for the entire lot, twenty-six different catalogues averaging thirty-eight pages apiece, and costing about 2½ cents apiece. The 184-page catalogues,



Prehistoric Arastras and Buildings, Cumal Mines & Development Co.

nora, Mexico, and comprises 667 pertenencias, included in nine groups of mines. The ores are copper-silver ores, carrying a small amount of gold, and are sufficiently ferruginous and calcareous to smelt well without foreign fluxes. The group known as 'La Fundaciones' covers the ground which the Mexican engineers in 1854 established as the place where the great number of huge 'planchas de plata' were found. One piece of nearly pure silver weighed 2700 pounds. The Cumal Mines & Development Co.'s



Ancient Smelters and Buildings, Cumal Mines & Development Co.

We followed the practice of good purchasing agents by turning every stone and giving all comers a "chance to bid." The bids on average ranged from 1 as the lowest to 1.66 as the highest on the same specifications. Sometimes one bidder would be high and at the next bidding, determined to win out, would make the lowest bid. Again a well employed printing shop would not bid as low as a shop more anxious for work. The effect of this policy was to reduce costs by at least 25% over reliance upon a

subject "Gold Stamp Mills," from plates with changes cost 6 cents apiece.

This was in the day of economy. My own idea of a better kind of economy would have been to reduce the bulk of the catalogues, cutting out irrelevant matter and putting the money saved into better printing for the remainder. But the tendency was to "bulk up" editions with the pet ideas and loose phraseology of different people, and if a man could sell a machine the catalogue editor was enjoined to

let him run almost "any old thing" into the catalogue.

In the attempt to make more elegant catalogues the system of plating was abandoned. On one of these more elegant catalogues, richly embellished with new halftone cuts, printed on heavy enameled paper, and more than all employing the services of expensive engineers for a year or two in its composition, the actual expenses were per copy for an edition of 5000, 216 pages, 6x9-inch standard, each book weighing sixteen ounces:

Paper	5 cents
Composition	11 cents
Presswork	2 cents
Electrotypes	2 cents
Changes	2 cents
Engravings	11 cents
Services	28 cents

Total.....61 cents

The postage was 9 cents with weight of envelope included. The pictures were handsome, but the text was not brainy, nor well arranged, nor of much definite value in point of information. It should be said, however, in justice to persons who make and edit such productions, that they work under sealed orders, and are not expected to furnish any information which will enable a customer to find his own way without consultation, or give a hint useful to the engineers of a competitor.

One of these catalogues, touching a metallurgical subject, was unique as a masterpiece of work of this kind. It was written by a scholarly man and revised by an Eastern critic, so that in style as a piece of Addisonian English it was perfect. Magazine articles of the ordinary run are rough writing compared with it. Apart from some general principles it gave no useful information. Despite its williness and elegance the reader absorbed the impression that further knowledge could be had only after a handsome investment. The whole edition was called for in a short time, implying widespread interest. But it convinced no one. It was written to too fine points. The hunt man looking for a plain yes or no found more to suspect than to help, and the booklet did not sell a single plant or promote a single metallurgical enterprise.

Another catalogue by the hustling salesman of a large machinery house had an opening load in a long paragraph that was calculated to give a person the headache. It appeared to have a show of reason but made no sense, reached no conclusion. The trouble with the writer was that he did not posit or state anything, but got lost in a long string of qualifying clauses until at last he forgot to put in the positive statement on which such clauses need to rest. In the next edition I broke that paragraph up into five sentences with a positive statement in each one of them.

I do not want to be personal or I could furnish some curious examples of absolute inanity formulated into the appearance of rational statement by some experts whose literary and metallurgical training has been of the highest order. I shall never forget the charming candor of one of these gentlemen when I diffidently indicated the matter. "That's so," he said after a little thought, "I never looked at it in that light before. It's a sure enough fallacy. Strike it out of the next edition."

Some of these instances ran through many editions, and no one noticed them. This brings up the question: Do people read catalogues? Not generally to any avoidable extent.

In an existing catalogue I made a bad mistake. It was on an important point of theory. When I found it I was worried. I said: I will let some one else find it, for I could not see that it would lead to any injustice or business deception. No one has apparently noticed it. I have some friends who would be tickled to find it, but I fear they are not interested readers of my catalogues.

Another case. A credit notice was put in a catalogue. It made trouble. Our agents did not read it. We did not notice the effect of it ourselves. But way down in Bolivia a Spanish gentleman who read catalogues studied it out, and claimed 1% discount on the strength of it. Our agent reported this loss and suggested that it be charged to the catalogue editor, but he found little difficulty in unloading the responsibility upon some one else.

We hurried to get this credit notice out of our catalogues, but next year a competitor in the Far West brought out a brand new catalogue in which he copied our page with the offending notice. Lightning seldom strikes twice in the same place, and it may be that he will never be troubled by Bolivian catalogue readers.

These paragraphs have introduced a semi-responsible person called the catalogue editor, whose relation to our subject may be illustrated by the story of the negro preacher who said: "When Moses was with the Lord in the Garden of Eden," at which one of his elders pulled his coat tail and whispered: "Moses wasn't there," and after several such interruptions of increasing emphasis, the hangered speaker turned upon his critic with the declaration: "I say he was there, or thereabouts." The catalogue editor isn't there until some wrong is discovered, and then he comes in handy. Being a Yale alumnus and a graduate student of Harvard, at the races, whichever side won, I was always on the defeated side. Such ex-

periences educate one to be a catalogue editor, and I was never reconciled to having my ideals of what a catalogue should be twisted out of all recognition until I became convinced that catalogues are rarely read. For this reason a catalogue should have a richly embossed cover. We are too much concerned about the insides of books, and the best part of the show is usually on the hill boards, where he who runs may read, if his early education has not been neglected.

What we need to do with catalogues is to use them to reach the sympathies of those to whom we send them. As it is we expend our money and energies in getting them to a list of people, and when they reach the mark they fall like spent balls without making any impression.

The test is this: A good catalogue is good enough to be paid for. Because catalogues are free, and are forced upon people like sturdy heggars for attention, they are essentially poor.

Put the matter this way: Suppose that catalogues were required to be so interesting that people would pay for them, or else they would have no circulation. Would there not be something of an awakening in the subject matter of catalogues? It is true that some very poor technical books are sold for money, but the purchasers do not usually find what they are until they are paid for. Both are frequently poor, but the pooriness of the catalogue reaps a reward of inattention, while that of the technical book reaps a reward of small circulation.

But the strong living commercial force behind the catalogue makes it a more promising proposition than the text-book. I want to reach people with my wares. Using 6x9-inch circulars, I can send for about \$100 eight-page circulars to about 6000 persons, or twenty-four-page circulars to about 3800 persons, or seventy-two-page circulars to about 1200 persons, or 216-page books to about 550 persons. This would look promising were it not that it is hard to get good lists of people likely to be interested, and most of those who receive the catalogue can say in the language of current slang: "It never touched me." With all the halftones, and embossed chalky paper and fine pictures and gilt covers, the usual catalogue is only good in an inferior sense. It has no magnetic attraction of value in itself. It is not a treasure, nor a companion, nor anything like the helper it might be to the person who obtains it. It does not put itself in a man's place and guide him with sincerity in what he can best do. Now this is not cheap and easy like most catalogue composition. It requires more cleverness, more ability, more knowledge, more acquaintance with the subject, more sympathy with the man, and more impartial truth.

But if this kind of value is put into a catalogue, it will be found out. It will not have to be forced upon lists of reluctant recipients. It will not have to be given away. It can be sold. It will require the best durable binding. It is a commentary on the lack of value in the ordinary catalogue that it is usually given a paper cover that will stand little use. This is an advance admission by the publishers that it will not be much used, nor very useful.

Our catalogues may be called good as catalogues. But they must be "damned by faint praise" when we allow that they are partial and plausible, perfunctory in treatment, ill digested and ill fitted to be a complete reliance for their readers on the subjects treated. Their cheapness is often dear in the long run. There is in this or in an improved world to which they will happily contribute room for catalogues of a worthier character than the kind we now have. There is scope for more conscience, and more diligence in making them, and when we see fit to put this value into them they will be worth buying.

But how, it may be asked, will fare the commercial interests which put forth such ideal catalogues? In answer to that I would say "excellently well," for although some business men yield to the temptations of the "short measure and deceitful weight," I am sorry for the man who has lost hold upon the principle that good business is in its greatest success for the largest good of all concerned.

(TO BE CONTINUED.)

The Traveling Salesman.

The traveling salesman is regarded by some at a high value and by others as an evil—a necessary evil. Speaking from a manufacturer's point of view, he costs money, and, whether he brings in orders or not, his expenses go on just the same, eating up the profits of the business. He is out for orders, and may think that with getting them his responsibility ends. The firm must take care of these orders, must fill them, settle any misunderstandings, take all the chances of getting back not only his salary, but the salaries of the workmen in the factory, the interest on the money invested in the business, the taxes, insurance, wear and tear of machinery, losses on poor accounts, depreciation of stock and materials—in fact, there seems to be no end to the expenses the firm has got to stand before they can figure out any profit to themselves in the business. All the worry, the care and detail must be borne by somebody. Somebody must stake everything, and wait patiently for any

return for their own hard work and capital invested. When traveling men appreciate this fact they begin to be really valuable to any firm. The man who stands up and asserts that after he has turned in his order the firm has no further claim upon him, may be right according to the strict letter of the law, but he is not the most valuable salesman the firm could employ, and the firm knows it. The man who takes no further interest in the business than to do no more than is absolutely required of him to enable him to hold his position, is not the man the firm will ever tie to, so to speak. In these days—in any day for that matter—and all the time, the traveling salesman who takes off his coat and says to himself: "I will do anything in my power to help the firm that employs me, as if it was my own business," that salesman is bound to become an indispensable man. Not only the orders on the road, but the credits and collections, and a thousand and one things come under his eye, and he can give valuable advice and suggestions in all these matters. When he is at the factory between trips, there is always work to be done and he will pitch into it and make himself as valuable at headquarters as on the road. That is the ideal traveling salesman—the salesman who ought to have an interest in the business, or some time know just how to successfully run one of his own.

Details of Cyaniding.

Written for the MINING AND SCIENTIFIC PRESS by
ERNEST GAYFORD.

Following is an account of the process of milling employed by the Horseshoe G. M. Co., Fay, Lincoln county, Nevada:

The ore is delivered direct from the main shaft of the mine to the crusher chute. In the center of the chute it passes over a grizzly with bars set $\frac{1}{2}$ inch apart, the undersize going direct to the storage bin, the oversize going into a No. 3 D style Gates crusher set to crush to a $2\frac{1}{2}$ -inch ring. The product of No. 3 crusher passes over another grizzly, by which the material under $\frac{1}{2}$ inch in size is taken out and falls into the storage bin, the coarser material going to an H style gyrating Gates crusher, and is reduced to $\frac{1}{2}$ -inch mesh and discharged into the storage bin, which has a capacity of 300 tons. From the storage bin the ore is fed by a plunger feed working fifty-two strokes per minute, and feeding 3 pounds to the stroke, to a Gates revolving dryer making forty-five revolutions per minute, and is passed into the hoot of No. 1 elevator, taking from fifteen to twenty minutes in its passage. No. 1 elevator is set at about 70° angle and consists of a 14-inch Leviathan belt with 6x12-inch huckets set at 24-inch centers. This takes the ore as it is discharged from the dryer and delivers it to a 4x8-foot revolving screen. Here the 6-mesh material is taken out and sent by gravity to the hoot of No. 2 elevator. The oversize (material coarser than 6-mesh) falls direct to a set of 36x15 Gates rolls, whence it goes again to No. 1 elevator and is again elevated to No. 1 screen. The undersize from No. 1 screen is taken by No. 2 elevator and delivered to two 4x8-foot revolving screens, by which the 12-mesh material is taken out and drops into the hoot of No. 3 elevator. Material too coarse to pass through a 12-mesh screen is taken by gravity and passed through a set of 26x15 Gates rolls, again sent to No. 2 elevator and again elevated to No. 2 screens. The undersize from the No. 2 screens is elevated by No. 3 elevator and discharged in equal streams to three 4x8-foot revolving screens, where the 24-mesh material is screened out and dropped into the pulp storage bin, which has a storage capacity of 150 tons. The oversize from the 24-mesh screens is sent to another set of 26x15 rolls, when it is again elevated and again screened. From this it will be seen that once a finished product is made—that is, once any portion of the ore is reduced fine enough to pass a 24-mesh screen—it is sent direct to the storage pulp bin. It never goes again to any crushing machine, thus obviating the danger of sand packing in the rolls. The mill, when running to its full capacity, will crush about 110 tons to 24-mesh. The mill is driven by a 16x36, high pressure Bates-Corliss engine, power being supplied by one 80 and two 60 H. P. boilers.

LEACHING ROOM.—This consists of nine circular all-steel tanks, 24 feet diameter, 5 feet deep in the clear. Each tank is provided with a false bottom, made as follows: 2x2 $\frac{1}{2}$ -inch slats, with half holes bored on their under sides (to allow free passage for the solution to the outlet pipes), are laid on their narrow dimensions on the bottom proper of the tank, the slats being 8 inches from center to center. These come to within 2 inches of the sides of the tank. On the top of the slats are nailed 1-inch boards, perforated with 1-inch holes, bored 3 inches apart. A 3x1-inch strip is then bent around the circumference of the false bottom, so leaving a 1-inch space between the side of the tank and of the false bottom. The filter bed is then laid on the false bottom. It consists of a circular canvas-bound filter of cocoa matting, which, when tacked down, reaches to the outer edge of the false bottom. On the top of this is laid a second filter of 10-ounce duck canvas, made 6 inches wider in diameter than the cocoa matting. This is stretched in place by means of a $\frac{1}{4}$ -inch rope, which

is wedged down into the space between the false bottom and the sides of the tank. On the top of the canvas $\frac{1}{2}$ -inch channel iron strips are nailed 4 inches apart to protect it from the shovels when discharging a tank. Each tank is fitted with four discharge gates with 16-inch openings and four 2-inch holes through various places in the steel bottom, under which flanges are riveted to receive the pipes for carrying the solutions to their respective launders. A double line of track for the charging cars is suspended over each tank. The pulp is trammed direct from the pulp bin, a sample taken from each car, each carload weighed and emptied into the tank receiving the charge, each tank holding about 95 tons dry pulp. When the tank is full the top of the charge is nicely leveled off and is then ready to receive the cyanide solution, which is put on as follows: Above the leaching tanks are placed three stock solution tanks 15 feet in diameter and 9 feet deep. These tanks also act as sump tanks, as will be seen later. Two of these tanks are used for strong solution and one for weak. From the two strong stock tanks a $2\frac{1}{2}$ -inch iron pipe runs round the entire leaching room, resting on and placed a little inside the tanks. Two and one-half-inch plug valves are placed on the line over each tank, and a $2\frac{1}{2}$ -inch drop pipe runs from a tee on the main line and extends down just beneath the filter cloth of each tank. A $2\frac{1}{2}$ -inch line is run on the opposite side of the leaching tanks from the weak solution stock tank. When a sufficient quantity (from 24 to 26 tons) has been collected in one of the strong stock tanks a sample is taken and its strength in cyanide tested. It is then made up to a 0.3% solution (the strength of the standard solution used) by the addition of the necessary quantity of fresh cyanide. The solution is agitated by air by means of a 1-inch pipe line from the air reservoir. This also helps to aerate it.

The standardized solution is now run onto the charge in the leaching tank by means of the drop pipe attached to the strong solution line. This saturates the charge from the bottom. The valve on the stock tanks is regulated so that the solution is allowed to percolate up through the pulp at the rate of about 2 tons per hour.

After the charge is thoroughly saturated, taking about 25 tons solution, all the valves are shut off and the solution is allowed to remain in contact with the charge for twelve hours. The gold solution is then slowly drawn off by means of the discharge pipes underneath the tank and led into the strong solution launder, which carries it to the strong solution receiving tank.

After the charge has received about 40% of its weight of strong solution, 30 tons weak solution—averaging about 0.16% in cyanide—is run on the charge from the weak solution stock tank and through the weak solution main. This solution is carried off by the weak solution discharge pipes to the weak solution launder and into the weak solution receiving tank.

After the necessary weak solution has been run on the charge, 8 tons of fresh water are run on from the water main into the leaching room. The tank is then allowed to drain down until it only carries about 15% moisture, and is ready for discharging, which is done by being shoveled out of the four discharge gates into ore cars placed underneath.

The whole operation of filling, emptying and leaching requires nine days, allowing two days for filling and emptying. This gives the tank seven days to be under solution. Quicklime at the rate of 0.2% per ton of ore is fed with it into the No. 3 crusher to neutralize any acidity, and the consumption of cyanide per ton of ore ranges from .40 pound to .45 pound, giving a gold extraction of from 84% to 90%.

The gold solution in the receiving tanks is pumped by means of two $4\frac{1}{2}$ x3x4 Gardiner pumps to two 9x15-foot gold tanks, one for the strong and one for the weak solution. Connected by means of $2\frac{1}{2}$ -inch iron pipe with the strong solution gold tank are three precipitating boxes. These boxes are 9 feet long and 1.6 foot wide, and are divided into seven partitions $15\frac{1}{2}$ inches wide, 9 inches long and 16 inches deep, with one compartment at the end 14 inches long, which acts as a settler. A screen made of No. 16 iron punched with $\frac{1}{8}$ -inch holes is rested on $\frac{1}{2}$ -inch cleats, where it cuts the box off square. These screens support the zinc shavings which are packed in each of the seven compartments. The gold-bearing solution flows up through the shavings, down through the 2-inch space between each partition and up through the zinc into the next compartment.

It takes about 125 pounds of shavings to fill the box. The consumption of zinc per ton of ore varies from .25 pound to .30 pound. A continuous syphon sample of the solution is taken as it flows in and out of the zinc box, which is assayed every day for its gold value. This shows from 90% to 98% extraction, 75% of which takes place in the first two compartments. The gold-bearing solution in the weak gold tank is connected with one zinc box of similar pattern. The solution as it flows from the zinc box falls into the stock tanks mentioned previously, two of which are connected with the strong zinc boxes and one with the weak. This solution is re-strengthened and again used in the leaching tanks.

Twice a month the boxes are cleaned out. The system pursued here is as follows: The solution above the screens is drawn off by a $\frac{1}{2}$ -inch hose attached to

the $\frac{1}{2}$ -inch plug valves at the back of the box, and is run down into the stock tanks below. The less decomposed zinc is lifted out and laid on one side, and that which is badly decomposed, and shows signs of richness in gold, is taken out. Usually there is nothing above the screen in any but the first two compartments rich enough to take out. The screen is then lifted out, the plug taken out of the 1-inch pipe in the side launder, and the rich gold slimes are allowed to run down the launder into a receptacle placed to catch them under the outlet of the launder. These slimes, together with what was taken from above the screen, are put in an iron filter tank. The zinc box is washed out well with clean water. These washings are added to the rest in the filter tank and the bulk is allowed to filter by gravity. The less decomposed zinc is placed back in the head compartment of the zinc box and fresh zinc is placed at the lower end to fill up the box.

When the bulk of the moisture has filtered out of the gold product in the filter tank it is taken out and placed in a steam dryer and thoroughly dried. It is then roughly sampled and transferred to a zinc-lined box, sealed up, and shipped to the buyers, where it is accurately and carefully sampled, the sample cut into three equal parts, one assayed by the sender, one by the buyer and one sealed for an umpire's sample, should any difference arise. This sample is seldom used. The gold is settled for on a basis of \$20.10 per ounce and the silver at 1 cent less than New York quotations. The product shows a value of from \$75 to \$92 per pound in gold and about \$2.50 in silver. The cost per ton of milling, including all expenses, is \$1.35.

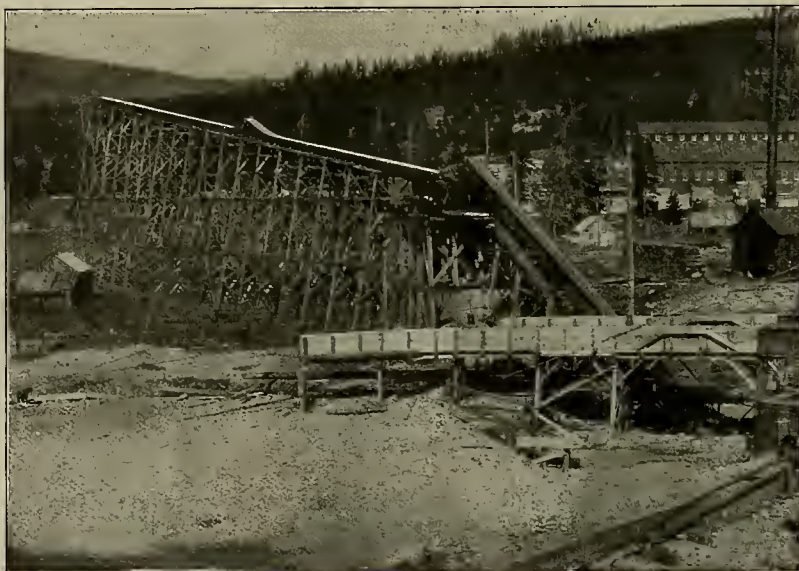
Appended is a table showing extraction by assay (theoretical extraction), extraction by bullion (actual extraction), average heads value, etc. This table is interesting because of the extraordinary closeness between the actual and theoretical extractions, as it covers a period during which nearly 50,000 tons were treated, showing that the system of sampling employed was accurately and carefully carried out, and also that the work done in the assay office was of a first-class order:

	Gold.	Silver.
Average heads value (by assay).....	\$ 7.45	1.215 oz.
Average tails value (by assay).....	1.08	0.717 oz.
Theoretical per cent saving.....	85.50	41
Actual per cent saving (by bullion).....	85.12	41.65

Tons crushed, 48,714; average consumption of cyanide per ton of ore, 0.405 pound; average consumption of zinc per ton of ore, 0.27 pound.

Robins Belt Conveyors as Tailings Stackers.

The plant of the Gold Pen Engineering & Mine Supply Co. is one of the largest placer mining operations in the world. It is situated at Breckenridge, Colo., on the Colorado & Southern Railroad. Some three years have been required to prepare the plant for operation. This work consisted of building a large ditch or canal 3 miles long and 8 feet wide, into which



Belt Conveyor as Tailings Stacker.

the water from the river is diverted when desired. At the lower end of the ditch the water enters a 60-inch pipe line, $\frac{1}{2}$ mile long, which feeds the hydraulic elevators and giants, the pressure at the elevators being 170 pounds per square inch. The season at Breckenridge is limited to 200 working days, and it was, therefore, important that the plant should be equipped to handle large quantities of gravel, as the river has not sufficient volume to take care of the desired amount. It became necessary to dispose of the tailings in some other way, and it was found that a mechanical device of the requisite capacity was made by the Robins Conveying Belt Co., 15-21 Park Row, New York, two of which were installed, as shown in the photographs here reproduced.

The conveyors are used in connection with the

Evans hydraulic elevators, the water rushing through the down-takes of which sucks the gold-bearing gravel in and raises it through the up lift pipes to the sluices—stones as large as 10 inches being lifted in this way. In the bottom of the sluices are the riffles which collect the gold.

The cut shows the sluices at the start of operation, when water and stones simply discharged from the end of the sluices to fill up a hollow which existed at this point. In the present operation a grizzly is placed at the end of each sluice, which allows the water and fine gravel to pass through it and fall into the natural channel of the river. The material which is too large to fall through the grizzlies goes to the receiving hopper of conveyor A. This hopper can be seen under the temporary flumes in the cut. Conveyor A elevates the material to a point over the track of the Colorado & Southern and discharges to Conveyor B, which is equipped with an automatic tripper, and running at an inclination of 7° reaches a height at its farther end of 80 feet. The tailings will be discharged by the conveyor about the trestle on which it runs, and when the trestle is completely covered by them the conveyor B will be moved off onto the pile thus formed. By keeping the conveyor moved close to the edge of the pile and allowing the tailings to fall over the edge a pile of enormous size can be formed.

The conveyors are 36 inches wide, A being 110 feet long, running at an angle of 23°, and B 300 feet long, running at an angle of 7°. They have a capacity of from 400 to 500 cubic yards of material per hour.

Mineral Wealth of China.

Written for the MINING AND SCIENTIFIC PRESS by
F. R. WARDLE.

The Empire of China is a sealed treasure house of vast mineral wealth, awaiting the hand of destiny to unlock its resources and lift its people from poverty and ignorant prejudice to a foremost place among the richest producing nations of the world. Many astute observers believe that the hour will soon strike—the key will force open the lock—and China will yield up its hidden riches, in such volume and value as will astound the world.

Coal exists in all the eighteen provinces; iron and copper in very extensive and widely distributed bodies, especially through Shansi, Shantung and Szechuen; gold in Manchuria, Shantung, Shansi, Shensi, Aupeh, Honan, Hunan, Szechuen and in almost all the northern and central provinces; silver, tin, lead and other metals abound. Diamonds are found in the blue clays around Ichoufu in southeastern Shantung, and other precious and semi-precious stones at various points throughout the Empire.

Each nation in its turn, as the hour of destiny strikes, has opened up its stores of treasure—first America, then Australia, later Africa, now Asia—nature's splendid crescendo.

During two years of travel in China, just completed, I met many of

the leading mining engineers, chiefly Americans and Germans, long resident in the Orient—such men as Deetring and Hoover of the Chinese Engineering & Mining Co. at Tientsin, Michaleis Hildebrandt and Director Schmidt of the German Mining Syndicate at Kiautschou; Captain Rich, Leigh Hunt, Archibald Little and others familiar with the upper Yangtse—and all agree that in coal and iron and, possibly, in the precious metals, China is to be regarded as one of the richest countries of the world. Millions of square miles of its vast territory have never been prospected; but within the comparatively limited area open to

expert European examination immensely rich deposits have been discovered, and in some cases concessions for their future working have been secured from the government at Pekin.

Taking up, now, the study in detail of the mineral resources of each province, commencing in the north, we find, first:

Manchuria, with an area of 380,000 square miles and an estimated population of 22,000,000. It is a terra incognita to European prospectors and, under Russian domination, is likely to so remain. During my visits to Port Arthur, Dalny, Talienhwan, Newchwang, along the Manchurian coast, I heard from Russian sources enough to satisfy me that the interior of the province is rich in metals and minerals, especially in gold, which shows in many of the streams and in

outcroppings of ledges. At one time mining for gold was a crime and miners were beheaded when caught; but the peasants have always worked in a crude, small way, and considerable quantities of gold have been produced.

Manchuria is a splendid, rolling country, full of beautiful scenery, abounding in fine forests and streams; a well-watered, grazing country, with a bright, cool, stimulating climate, peculiarly adapted to Europeans. Notwithstanding renewed protestations, designed to keep England and the United States quiescent, Russia surely intends to hold fast this long-coveted country, which she seized by force and retains under cover of false pretense. I have heard Russian officers brag when in their cups ("in vino veritas") that Russia would never loosen her grip on Manchuria unless compelled through force of arms by England, America and Japan. As long as smooth diplomatic assurances that the occupation is merely temporary find credence in Downing street and at Washington, so long will Russia continue successfully her nice little game of expert lying, in which she has only two equals—His Satanic Majesty and the Unspeakable Turk.

So, despite its richness, fine climate and virgin opportunities for profitable exploitations, Manchuria will not be for us the much-vaunted "open door"—that door opens only inward toward St. Petersburg, while the nations, like the foolish virgins in the parable, stand outside and knock in vain for entrance. It will take Krupp guns to knock with effect—nothing less.

South of Manchuria and Mongolia there is a wide belt of country, commonly referred to as North China, comprising the three adjacent provinces of Pechili, Shansi and Shensi, within which are the great coal measures that make China one of the first coal countries of the world. In the province of Shansi alone there are fields of bituminous and anthracite coal known to cover an area of 26,500 square miles. The concession to mine the Shansi fields is held by a wealthy English syndicate, which at present is not in active operation because of recent Boxer troubles. Large hodies of iron lay adjacent to the coal—conditions that have made Birmingham, Ala., so prosperous.

At Tongshan, in Pechili province, the famous Kaiping collieries are located, the output of which at one time reached 2,000,000 tons a year, but later fell off considerably. This valuable property is owned by the Chinese Engineering & Mining Co., recently taken over from its Chinese owners and placed under English management by Messrs. Moreing & Co. of London. A friend of mine, who knew the facts, told me that during the period of Chinese control over 6,000,000 taels (\$4,100,000) of the earnings were wasted and misappropriated by dishonest native officials. With honest and capable management, the property should now become a good dividend payer—a feeling evidently reflected in the recent advance in shares.

The sphere of German activity in railway building and mining lies immediately south of Pechili, in the province of Shantung. The Germans have fallen into the way of calling a considerable portion of this province "the hinterland" of their new colony of Kiautschou, and they consider it within their "sphere of influence." The eastern portion is mountainous and forms the promontory of Shantung, jutting far out into the Yellow sea. The western part is a fine rolling country, diversified with many beautiful valleys and streams. Shantung is the sacred province of China, containing the tombs of Confucius and his disciple Menicus; the holy mountain of Nansan, upon whose summit, 5000 feet high, an ancient order of priests have maintained continuous worship for 4000 years; then there is that stupendous work, the Grand Canal, over 600 miles long, which reduced to beggary the generation that built it; and last, but not least, there is the Yellow river, called by the natives "China's Sorrow," because its periodical floods bring destruction to life and property along its 1000 miles of tortuous course.

Tsingtau is the seaport of the German colony of Kiautschou, and thence a fine railroad has been built back into the interior as far as Wei-h'sien, opening up immense coal fields and iron mines around Poshan, some day destined to become a second Pennsylvania. A line of German steamers runs from Tsingtau to Shanghai and there connects with the North German Lloyds and Hamburg-American lines direct to Europe via Suez Canal. Shantung has an estimated population of 29,000,000 hardy, industrious people, who, under German tutelage, will develop greater industrial prosperity than forty centuries in the past have brought to them. From personal observation of the betterment brought thereby, I have become a staunch believer in "the partition of China" as the best and, in fact, the only way out.

In German Tsingtau the land theories and single tax ideas of the late Henry George are receiving their first practical testing. The Colonial Secretary, who is a doctor of philosophy of the University of Leipsic, became a convert to these views during his student days, and here in Kiautschou has put them into practical operation in a series of remarkable land laws, by which private title to land is abolished and only the usufruct, or use of the land, is sold for 25-year periods to those who erect buildings and begin improvements. There is only one tax levied in

the colony—an annual 6% tax on the original value of the land before improvements are made. There is no other tax of any kind and for the colony itself no customs duties.

Kiautschou is prospering and its port of Tsingtau will in time become of great importance. Greater freedom of individual initiative might advantageously replace some of the Government's paternalism and officialism. The advice about Lazarus, "Loose him and let him go," forms the best policy for vigorous pioneer colonies. That life hegets self-reliance and a desire for unrestricted action.

As Russia holds Manchuria for Russians, so Germany desires Shantung for Germans, and, while there is not positive exclusion, little effort is made to attract outsiders. In slicing up China, the various nationalities remind one of a pack of hungry, snarling dogs, each trying to drag off its particular bone and growling when would-be sharers of the spoil approach. The exhibition of naked, unblushing selfishness made by some of the Allied (?) Powers in China is not an elevating spectacle. If human nature be a poor, shabby thing, it is at least well to hide it under decent garments of convention.

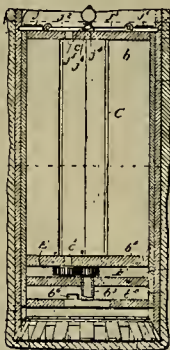
(TO BE CONTINUED.)

Mining and Metallurgical Patents.

Patents Issued October 14, 1902.

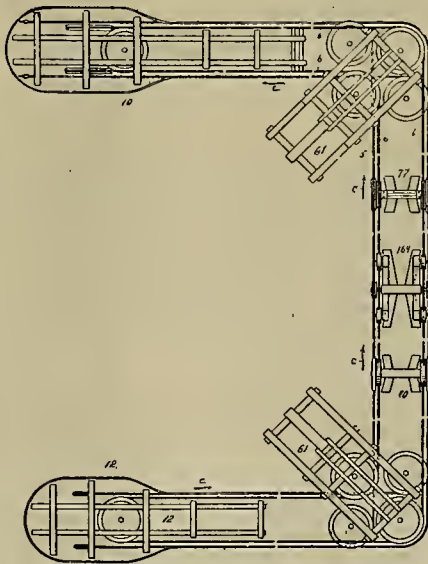
Specially Reported and Illustrated for the MINING AND SCIENTIFIC PRESS.

ROCK DRILL.—No. 710,935; A. Avery, Lowell, Mass.



Combination of shaft lining or casing, compressed air engine secured in casing, drill head rotated by engine having cutting bits arranged to operate in advance of casing to make opening of greater diameter than casing, engine being provided with dust chamber into which it exhausts and with passage outward from dust chamber between engine and casing, drill head being provided with dust discharging openings leading from front thereof into dust chamber to allow dust and cuttings to be carried from front of drill head back of engine and out of casing.

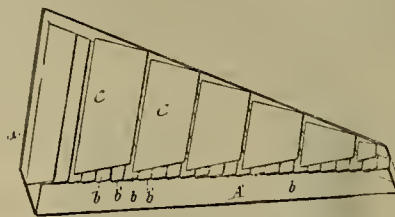
WIRE ROPE TRAMWAY.—No. 711,451; W. C. Davis, Denver, Colo.



In an overhead wire rope tramway, combination of stationary cables and traveling cable normally located above stationary cable, terminal stations at which stationary cables are suitably anchored, two stationary cables forming opposite sides of tramway line, traveling cable being suitably supported at stations and forming two sides of line intermediate the terminals and traveling in opposite directions, tower located between terminal stations and having two sheave wheels mounted thereon, arranged to engage portions of traveling cable moving in opposite directions, and two other wheels mounted on intermediate tower below first-named wheels and adapted to en-

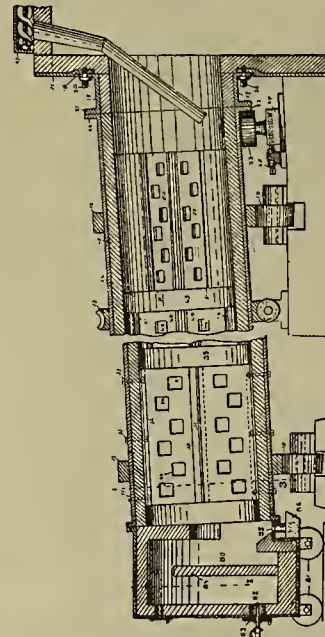
gage stationary cables which cross between their engaging wheels and change sides of line at this tower, and bent track rails bridging gaps between stationary cable lines at this turn.

ORE SEPARATOR.—No. 711,015; A. H. Stebbins, Little Rock, Ark.



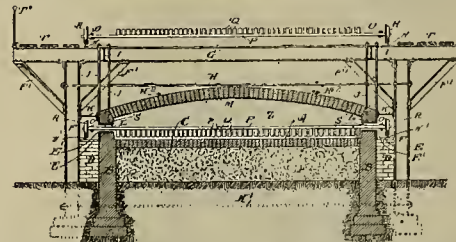
Combination of box-like frame wider at one end than other, means to deliver material across entire width of separator at its widest part, discharge opening at smaller end of separator, separating surface arranged within frame above bottom thereof to provide air chamber beneath surface, being provided with openings arranged at intervals directed substantially in plane of surface to discharge air or fluid blasts over separating surface and through material being treated to thereby stratify same according to specific gravities and move it toward discharge end of separator, series of cutting and conveying boards arranged above separating surface inclined thereto with cutting edges nearer to surfaces than discharge edges to thereby cut top strata from material and remove same from separator, means to direct blast of air or other fluid into chamber beneath separating surface.

REVOLVING FURNACE FOR ROASTING ORES.—No. 711,338; P. Naef, New York, N. Y.



Revolving roasting cylinder having an outer shell, brick lining, iron ore lifting devices, with radially adjustable bolts extending from outer shell through brick lining to ore-lifting devices and adjustably supporting latter independent of brick lining, whereby interior fittings can be repaired or renewed without interfering with lining and central supports for ore-lifting device.

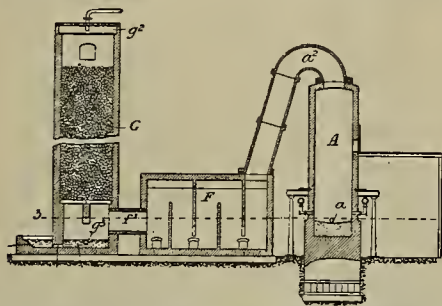
ROASTING FURNACE.—No. 711,352; D. Sheedy and M. W. Iles, Denver, Colo.



Furnace adapted for roasting, drying, calcining and chloridizing of ores and other materials having in combination base or hearth, frame extending over sides and top of base, angles L L supported by depending rods J J, upper ends of which are secured to parts of frame extending over top of base, laterally braced by vertical parts of frame, fixed top supported on angles entirely suspended from frame, disconnected from base at such a distance above same as to afford continuous openings on both sides for passage of stirring and conveying devices, transverse scrapers and stirrers passing through lateral open-

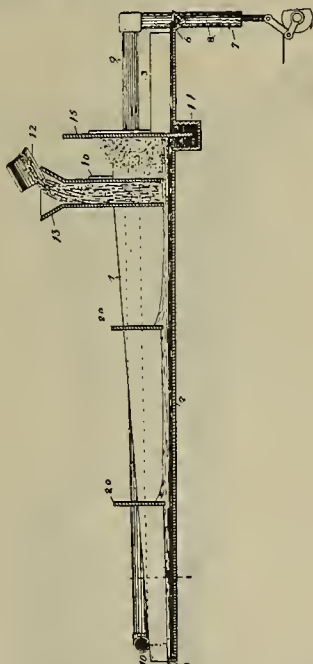
ings on each side of furnace, endless carriers O O, one on each side of furnace, connected with scrapers, extending back over fixed top, tracks or continuous supports also situated each side of furnace, bearings for outer ends of scrapers supported and moving on tracks.

PROCESS OF RECOVERING METALLIC COPPER FROM COPPER PRECIPITATE.—No. 711,173; D. McKechnie, Liverpool, England.



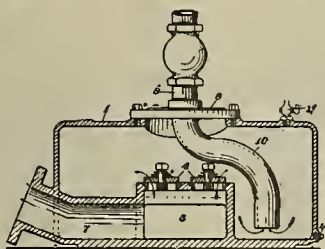
Process of recovering metallic copper from copper precipitate, consisting in forming precipitate into bricks, briquettes or like, drying same, smelting and subjecting bricks to reducing action in cupola or blast furnace, drawing material into reverberatory furnace, maintaining material in molten condition, separating copper from slag while material is in molten state, finally refining the copper.

SAVING FINE GOLD AND SULPHURETS.—No. 711,047; F. M. Graham, San Jose, Cal.



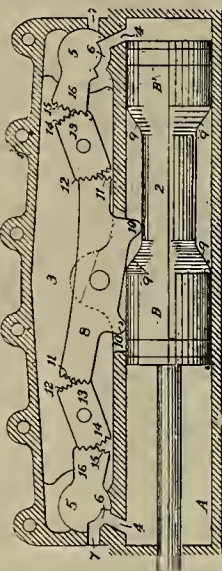
Process of treating gold-bearing material containing free gold and sulphurets to separate latter from residuum, which consists in causing stream of mercury to flow in one direction, adding water to gold-bearing material, causing water and gold-bearing material to flow on surface of stream of mercury in opposite direction to flow of latter, recovering free gold amalgamated with mercury, intercepting sulphurets carried on top of stream of mercury in opposite direction of flow of water, removing sulphurets thus accumulated.

HYDRAULIC RAM.—No. 711,076; J. Richards, San Francisco, Cal.



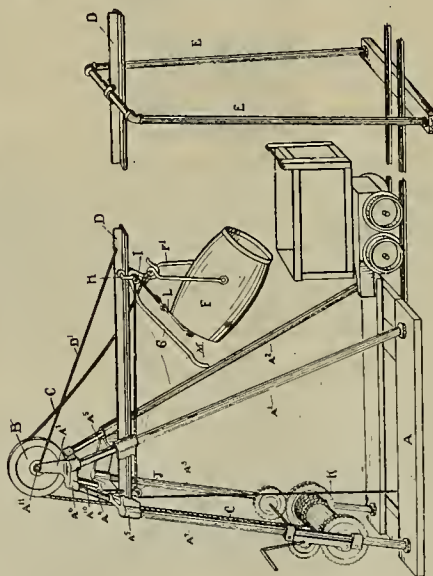
In hydraulic ram, an air chamber horizontally disposed, receiving chamber therein projecting laterally beyond air chamber on each side, waste valves mounted on projections outside of air chamber, check valves mounted on receiving chamber inside of air chamber, supply pipe to receiving chamber, discharge pipe from air chamber, curved snifting pipe, having ball valve at its extremity, for admitting air to air chamber, pipe being adjustable at various angles to vary gravitating resistance of ball to ingress of air.

ROCK DRILL.—No. 711,102; A. D. Foote, Grass Valley, Cal.



Combination in rock drill of cylinder, piston reciprocating therein having direct connection with drill shank, inlet and exhaust ports connecting with ends of cylinder, rotary oscillating valves located between ports, valve chamber within which valves are contained and with which communication is alternately formed, inclined surfaces formed on inner ends of pistons, oscillating member located within valve chamber, extending into path of travel of inclined piston face, oscillating connections between member and valves whereby they are oscillated.

HOISTING AND DUMPING DEVICE.—No. 711,049; C. Jackson, Denver, Colo.

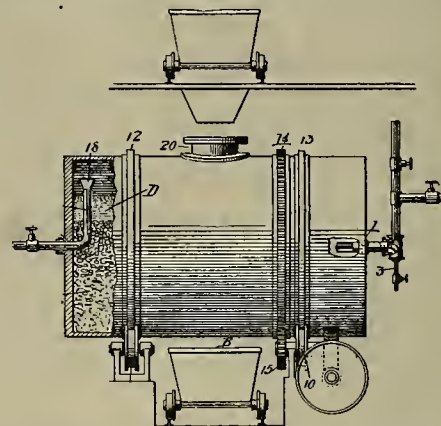


Combination of hoist, consisting of posts or supports, iron frame secured to posts, upward extension posts or supports to top of which is secured cap or frame, provided with lugs, sheave adapted to operate between lugs upon journal passing therethrough, rope or cable operating over sheave; with dumping device, by means of which bucket is conveyed and dumped at any convenient point from shaft, consisting of a T-rail secured to iron frame which is attached to posts, T-rail extending outward and slightly downward from point where it is secured to iron frame, having supporting rod or stay secured to outer end of T-rail and to lugs supporting sheave, truck device consisting of hook suspended from flanged rollers which operate upon T-rail, large hook contrivance, swung into semicircular indentation in hook of truck device, adapted to grasp bucket, rope or cable by means of which bucket is dumped, adapted to be passed through sheave attached to iron frame, thence through sheave attached to truck device, one end of rope being suspended into shaft to which is attached weight, other end provided with hook adapted to be attached to bottom of bucket when dumping.

PROCESS OF MAKING GRAPHITE.—No. 711,031; E. G. Acheson, Niagara Falls, N. Y.

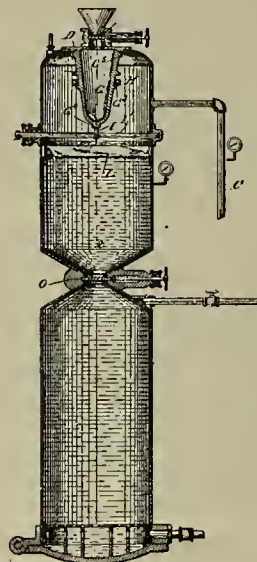
Method of making graphite, which consists in introducing into an electrical furnace mass of carbon to be graphitized, in form of lumps, also introducing thereto volatilizable material capable of forming carbide, heating same to high temperature, vaporizing volatilizable material, thereby causing vapor to permeate charge of lumps and to graphitize same.

APPARATUS FOR USE IN EXTRACTING PRECIOUS METALS FROM THEIR ORES.—No. 711,236; H. Smith and P. C. Brown, Salt Lake City, Utah.



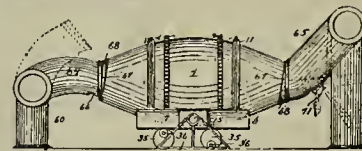
In lixiviation apparatus, revoluble tank for containing ores, pipe extending through one end of tank and upward almost to internal wall, means for rotating tank, pipes for supplying solvent solution, air and steam to tank, outlet for expulsion of air.

SLAG STEAM GENERATOR.—No. 711,290; L. D. Copeland, Los Angeles, Cal.



Slag steam generator comprising generator casing having seat, slag receiving receptacle movable in casing adapted to be seated with its open end on seat, charging device on generator at seat adapted to deliver molten or hot slag to receiving receptacle, means for supporting and tilting receiving receptacle when moving off its seat, cross bar held in casing adapted to divide or break up slag when dumped from receiving receptacle.

METALLURGICAL FURNACE.—No. 711,062; P. Meehan, Lowellville, Ohio.



Furnace for treating molten metal comprising rotary barrel-shaped furnace having open neck at each end, annular bands having V-grooves secured to barrel, bearing frame provided with semicircular V-grooved seats, anti-friction balls between bands and seats, mechanism for rotating barrel in frame, trunnions on which bearing frame is mounted, mechanism for tilting frame about trunnions.

Has the Desired Article.

TO THE EDITOR:—On page 193 of your issue of Oct. 4, 1902, I see where "F. T. S.," of Copper Mt., Alaska, wants "one ton or more of nicely colored rose quartz." We have the same and, possibly, pink satin spar, as wanted by "F. T. S.," Copper Mt. Our rose quartz assays \$40 gold, ten ounces silver, and from a trace to 4 1/2% copper. If your inquirers wish a ton or more of this ore we can let them have it for \$200 per ton on the dump. It would cost \$3 per ton to haul to Myrtle Creek station for shipment, making it, sacked and delivered at station, \$204 per ton. At a depth of 70 feet this ore changes to a white quartz. Myrtle Creek, Or. B. M. ARMITAGE.

Mining Summary.

Specially compiled and reported for the
MINING AND SCIENTIFIC PRESS.

ALASKA.

The U. S. Geological Survey expedition headed by F. C. Schrader, has returned from the Copper River region. The past season's work, which began in May, extended over a vast territory known as the headwaters of the Copper, Tanana and Nebesna rivers. A sub-expedition, headed by T. G. Gerdine, worked in the heart of the Copper River valley. Schrader says the year's work was satisfactory.

ARIZONA.

COCHISE COUNTY.

The Tombston Con. Includes sixty-eight claims. There are four steam hoilers. The four-compartment shaft is 24 by 11 feet. The pump station at the 600-foot level is 14 by 61 feet, and the capacity of the pump over 20,000 gallons per minute. For some time they have had men opening, cleaning and enlarging the old drifts and running new drifts to make connections with the shafts for ventilating purposes.

Fifty-seven mining locations were filed for record at the recorder's office during the past week. The locations are in all parts of the county.

The Old Terrible M. Co. at Manzora, in the Dragon mountains, has a new 20-stamp mill which daily crushes and mills sixty tons. The fuel used for running both the mill and pumping plant is crude oil. The ore runs \$20 to the ton, concentrating in a ratio of 8 to 1, and produces seven and one-half tons of concentrates, averaging approximately \$160 per ton. The mine and mill is in charge of J. R. Carey.

GILA COUNTY.

Globe reports that the strained situation that has existed there between the Old Dominion C. Co. and the miners has been adjusted. The superintendents of the four mines are preparing a proposition showing the conditions under which the mines must be operated. The right of employees to organize for their own benefit was recognized. It is stipulated that the companies will not discriminate between union and non-union men, but the companies reserve the right to employ whom they like. The boycott, fair and unfair, is to be withdrawn. The scale of \$3.50 for miners and \$3 for top men shall remain as at present, and not to be changed without 30 days notice. No strikes shall be declared until the grievance has first been submitted to the employer and an effort made to adjust it. The union meeting accepted these terms by almost a unanimous vote. Railroad freight rates also have been adjusted satisfactorily to the companies. The miners will resume work at once.

The Old Dominion C. M. & S. Co., at Globe, has brought two suits in equity against A. S. Bigelow, its former president. An attachment levied on his property has been released by the filing of a bond for \$500,000. The suits are brought in the Massachusetts Supreme Judicial Court to recover 30,000 shares of Old Dominion, or the proceeds thereof, which it is alleged were wrongfully delivered to A. S. Bigelow and the late L. Lewisohn, a director in the company, in exchange for deeds to four mining claims which have never been worked, and which the present management claims are of doubtful value. Recovery of 20,000 shares, which were turned over to the same parties for promoters' fees and expenses in connection with the organization of the company in 1895, is sought also.

President Smith, of the Old Dominion, says that the plans of the present management with regard to the immediate future are largely "in the air," that is to say, are contingent upon developments. The property as a mine, according to Mr. Smith, is of more promise than even expert reports had indicated. There are nearly 20 miles of openings, and the recent rate of production could be carried on for several years without further blocking out of ore bodies. The property, up to the time of closing down, several weeks ago, had been producing on an average of 10,000,000 pounds of copper per annum. At the present time the furnaces are not in operation, although development work underground is still being carried on.

With its present equipment of furnaces, the plant, it is claimed, can produce three times what it has been producing. When the matter of freights has been decided, the smelting of ores it is said can be done at 33% less cost than heretofore. There are at present on hand about 2000 tons of matte running 70% copper. It is upon the question of reversion of matte that the plans of the new management are not perfected. Various propositions have

been considered, but nothing has been permanently adopted. Such changes as will be made, it is stated, will require no more money than can be furnished by the company itself.

The A. B. C. C. Co. is organized to develop and operate a group of claims adjacent to the Old Dominion, United Globe and Arizona Commercial properties. A. E. Wiley is manager.

MARICOPA COUNTY.

The Phoenix & Eastern Railroad will be built from Phoenix to Benson and forming what may eventually be 180 miles of another transcontinental railroad. It will connect at Benson with the Phelps Dodge road, a part of the Rock Island system.

Near Wickenburg, at the Black Rock property, two shifts are being worked on a large low-grade ore body. On the White mine three shifts are driving a tunnel through the mountain along a well defined ledge, which, though considerably smaller than the Black Rock, is rich. The tunnel is being run from the bank of the Hassayampa through the mountain. At the Socorro mine the 20-stamp mill will be completed this week, when E. M. Keeley will give it a trial before turning it over to the company.

MOHAVE COUNTY.

At the Gold Roads group, near Kingman, it is stated the ore exposed, 100,000 tons, averages \$15. A cyanide plant is building under the personal direction of O. P. Posey.

Near Kingman a company is to be organized to work the Oro Plata mine; a fifty-ton plant will be installed, a calcining furnace put in and the product of the concentrating tables reduced on the ground. C. D. Pickering, at the San Francisco mine, has twelve men. A crosscut is being run from the bottom of the main shaft to cut the vein from wall to wall. The crosscut is in good ore. The shaft will be sunk to the 400 level. When the 400 level is reached a reduction plant will be in order.

A local report says: "The Gold Roads Co. are hiring all the miners that ask for employment. Over fifty miners have gone to the camp this past week. The company say they will put on 200 men."

YAVAPAI COUNTY.

W. S. Owen, superintendent Decatur M. Co.'s properties, in the Jerome copper district and Mineral Point gold district, has telegraphic instructions from the company's headquarters in Decatur, Ill., to begin operations on the Decatur group. Miners are driving the drift at the 272-foot level in the main shaft.

Manager W. D. Powell of the Black Rock G. & C. M. Co. is sinking a working shaft on the Ontario mine and has a ledge of gold, silver and copper ore. The vein is 5 feet wide; drifts are being run each way. The shaft will be sunk deeper and two levels run. Copper predominates in the ore.

With Manager Giroux's return much is expected at the Iron King. Surveys have been made to locate a smelter. A tramway will be built from the mine to the smelter 1 mile long. Houses are to be built, roads constructed and other improvements undertaken.

CALIFORNIA.

ALAMEDA COUNTY.

The Pennsylvania Mining, Developing & Operating Co. has incorporated in Oakland, capital stock \$200,000, \$3000 subscribed; W. F. Green, J. E. Henderson, A. G. Randlett, J. E. Fleming, H. G. Morrow, Oakland.

EL DORADO COUNTY.

At the Zimmerman mine, near the Pacific, eighteen men are employed. A tunnel will be begun between Pacific House and Bullion Bend, to run 3000 feet to strike the channel.

P. P. Webb has finished a 5-stamp mill at the Crystal mine.

HUMBOLDT COUNTY.

Manager Hales, Orleans Bar G. M. Co., says preparations are being made for next winter's run. The O. B. G. M. Co. are moving the machinery to a new bar.

KERN COUNTY.

(Special Correspondence).—Some time since a special correspondent of one of the leading Los Angeles papers was writing up some mining news in eastern California and Arizona and wrote an article from Randsburg stating that there had been a lot of friction between the Miners' Union and the Yellow Aster M. & M. Co., and that there was a prospect of the mine being closed down. A few days later, on Oct. 6, another article was published that the mine was closed down on Oct. 1. The article gave as the reason for the alleged trouble that the muckers had demanded an increase in wages. The paper that published this article in Los Angeles, under very large headlines, corrected it the next day in a very small note. Now,

nearly all of the papers on the coast, including some "mining journals," have published the statement that the mine was closed down, and while one of these "mining journals" in last week's issue published a letter from Randsburg correcting it, I have so far seen no other corrections. Misstatements of this kind, while they do us little or no damage, certainly do the company no good and they do Randsburg and that section very great injustice. Please publish that the statements that the mine was closed down, that the company had trouble with its miners, and that there have been demands made for increased wages, are wholly incorrect. Such correction, when published in your journal, will put an end to the general belief that the mine is closed down.

Randsburg, Oct. 20.

The Baltic M. Co.'s new 10-stamp mill is in operation at Randsburg.

MERCED COUNTY.

Lewisohn Bros. of No. 11 Broadway, New York, through their manager, E. G. Tuttle, are prospecting on the Merced river, 20 miles northeast of the city of Merced, for gold and other metals. A traction engine is running a drill; men are sinking shafts and others rocking out dirt and gravel, under the superintendency of E. E. McCarthy. The drills are sent down to the bedrock, which lies 15 to 20 feet below the surface.

MONO COUNTY.

The following is from the Reno Journal: I noticed in your paper of the 10th an item copied from the Gardnerville Record saying that myself and Mr. Blackburn had uncovered \$100,000 worth of rich ore. I wish it was correct. For the benefit of those who might spend their time and money I will say that it is not so. I bought nine-tenths of the Golden Gate property and Mr. Blackburn one-tenth, but we have not uncovered any ore, nor have we worked on the mine since my arrival here. We have some ore, but are not working the mine at present, as I am putting up buildings to live in this winter. There are no prospectors rushing in here as reported. I will not be ready to do any mining for at least a month, and allow no one to go into the mine, so you see the report of a rich strike is made out of whole cloth. I wish you would contradict that report as I don't like to see any poor devil spend his money and time on what might be a wild goose chase. When I make a rich strike I shall certainly make it known. I think our property is good, but I see no reason for an excitement so far. Yours truly, J. L. WEDEKIND.

Coleville, Cal., Oct. 14.

NEVADA COUNTY.

The first payment of \$5000 on the purchase price of the Perrin mine has been paid to C. W. Kitts by G. W. Root.

A stamp mill will be built for the Sixteen-to-One mine near Washington.

Manager Enzensperger of the Red Cross group at Nevada City, says the new mill will be ready for work in December.

Good ore has been extracted from the Black Bear mine, the Rough and Ready district. The Black Bear is under bond to San Francisco men.

PLACER COUNTY.

The Alameda G. M. Co. are building a 20-stamp mill at their mine in Black canyon, near Westville.

The Auburn Herald reports much activity in Ophir mining district.—The Eclipse 10-stamp mill is being operated by a 35 H. P. gasoline engine.—Kelly & Cox have taken out three tons free gold ore on the Folk Ranch on North ravine which netted \$1667 at Malmborg's mill.

—The Eclipse Co. have bonded the old Crater Hill mine from the heirs of the late G. D. Aldrich, and, it is reported, will begin operations on a large scale. It is estimated that nearly \$1,000,000 has been taken out of the Crater.—Near Bath fifteen men are employed at the Washington quartz mine. The mill is running steadily on good ore.—Work on the Dewey tunnel is being pushed.—The Leigh Canyon mine has had a clean-up, with satisfactory results.

SAN BERNARDINO COUNTY.

A deed is recorded in San Bernardino showing the transfer of the Birch Consolidated group of mines in the Vanderhill district from the Federal G. M. Co. to C. H. Thompson. The deed names \$150,000 as the price.

B. F. Lewis, of Los Angeles, has bought the Elvira group of claims. He will purchase the surrounding claims and form a company to develop the properties. The company will be known as the Parallel G. M. Co.

SAN LUIS OBISPO COUNTY.

The California Coal & Iron Co., owning undeveloped coal lands in the Huasna country, 30 miles from the city of San Luis Obispo, will begin development. The company was organized August 23, 1902,

capital \$2,000,000, W. W. Jennings president, main office at San Jose. The company owns 1600 acres. They are driving a tunnel at an outcropping and expect to strike a vein of coal 8 feet in thickness when in 100 feet. Forty feet has already been run.

The Stone Canyon Coal Co. is prospecting and developing their mine. They are down 410 feet, where the vein shows 17 feet of coal. They use two traction engines in hauling the coal to the railroad at Bradley, each engine hauling ten tons. The owners propose to build a railroad of their own to tide water.

SANTA CLARA COUNTY.

The New Cerro Bonita Quicksilver M. Co. is incorporated at San Jose, capital stock \$2,000,000, \$950,000 subscribed; H. R. Bradford, W. C. Kennedy of San Jose, J. and C. G. Treadwell, Oakland, B. M. Bradford, San Francisco, directors.

SHASTA COUNTY.

The Mountain Copper Co. is locating a number of claims in the territory immediately north of Whiskeytown.

The contract is signed for the construction of the McCloud River Power Company's dam and ditch. The board of directors will meet in South Dakota Nov. 12, at which time the contract will be ratified. Engineer Freeland is perfecting plans. Work will begin as soon as the contract is ratified.

SIERRA COUNTY.

The Crystal Lake M. Co., in a pocket partly blown to pieces by a blast, took out \$1500 recently. Five stamps of the mill have been temporarily closed down.

SISKIYOU COUNTY.

The Deadwood Q. M. Co. is incorporated at Yreka, capital stock, \$250,000, all subscribed; G. J. Reiner, E. T. Wallace, H. B. Gillis, R. S. Taylor and J. S. Cook, Yreka, directors.

Mining operations at the Cherry Hill gold mines are to be resumed. The tunnel now being driven near the base of Cherry Hill will be given an uplift of about 1300 feet, and through this tunnel all of the lodes in the Consolidated group of mines will be drained and mined.

The Jumbo mine, on White's gulch, owned by H. J. Eldridge & Co. of Sawyer's Bar, is to be worked this winter.

SONOMA COUNTY.

Surveyors in Pine Flat district are surveying the Crown Point, Hope and Quicksilver Queen mines, on which the owners, a stock company in which local people are interested, wish to get a patent.

TUOLUMNE COUNTY.

(Special Correspondence).—M. E. Sanford of Sonora bought at public auction the Columbus mine and North Extension, near Soulsbyville. These mines were the property of the late Citizens' Bank of Sonora.

The Eagle-Shawmut Co.'s 8000-gallon storage tank for crude oil at the Chinese depot of the Sierra Railroad is completed, and a 10,000-gallon tank is to be built at the chlorination works.

The Gold Ridge M. & M. Co. of Arizona, which is operating northeasterly and adjoining the Eagle-Shawmut mine, held its annual meeting to-day in Sonora. J. A. Van Harlingen was elected president, vice W. Jones, resigned.

Sonora, Oct. 25.

The Sunnyside tramway has been repaired and the machinery let down. A new cable has been bought. The mill will be started November 1. The Pine Nut and Viola claims, owned by J. Richards, are to be worked. The Truemeyer, near the Magnolia, is being crosscutted. The Magnolia and Argol claims, on the main river, are being developed. Mining men will open the Jersey Blue mine.

The Temescal mine, near Confidence, has started up. F. McPherson, the original owner, has leased it back from the company.

It is thought electric drills will be used in the Rawhide mine when operations are resumed. The Rawhide Extension Co. decline to use water or electric power on account of the long and expensive shut-downs, which they figure bring the cost of mill work, etc., up to the average of steam power with wood at \$5 a cord. They will use oil for fuel as soon as the present supply of wood is exhausted, finding it cheaper. Two other companies on the mother lode are figuring on running their plants by steam power the year around.

Sinking in the Dutch mine is resumed. The shaft is to be sunk 150 feet from the 1300 level.

Tuolumne reports that the strike in the New Era mine shows ore which runs \$260 a ton. This is a mine in which a former company stopped 8 feet from rich ore because of lack of funds.

F. McPherson is operating the Temescal mine, near Sugar Pine.

The Independent reports that R. Marshall has bonded to K. C. Parrish of Denver the Spring Gulch mine and mill site,

containing 39.28 acres of patented land, also the Canyon mine; purchase price \$30,000, \$15,000 to be paid within a year and the balance within two years from date. Parrish agrees to expend in development work in the mine, timbering, sinking and running drifts, levels and crosscuts at least \$1000 within each two months during the life of the agreement, and shall pay 25% of the gross proceeds of the mine which will apply on the purchase price. Sharwood & Marshall have bonded to him a three-fourths and one-fourth interest respectively in the Somerset quartz mine, north extension of the Spring Gulch mine; price \$6000, payable within two years. Holland, Carter, Hines & Gallagher have agreed to sell to him the New Era or Hunter mine, also a three-fourths interest in the Chilcote Pass quartz mine, the Plateau mine, and a water right of 500 inches of water in Hunter creek; price \$15,000, payable \$9000 before May 15, 1903; the balance before Nov. 15, 1904.

At the Old Street mine, Tuttle town, the lowest level has been entered north of shaft 200 feet. There is a body of ore that shows free gold after every blast. The mill is crushing by water power derived from the old Gale ditch. Oil is used as fuel at the hoist.

At the Bell mine, Tuttle town, a trial crushing is being put through. Sufficient gold has been seen in the breaking down to warrant a good return. The shaft is now 450 feet deep.

The Good Return Placer M. Co.'s property on the South Fork and main Stanislaus river has a crib wing dam 600 feet long. It is the intention next year to construct a concrete dam across the river, and at the low water season turn the water into the flumes.

At the Richards Placer Association, at Table Mountain, the No. 2 shaft is down over 400 feet and still sinking in cement, the pay gravel not having been reached. The superintendent thinks the dead river has made a turn to the west. Still a further distance will have to be sunk before the pay is struck. The water is held by a duplex pump, 4-inch discharge. At the Woodside gravel mine, near Springfield, sinking toward main channel has been temporarily suspended as the superintendent has been compelled to return to the east channel to make some repairs by timbering. The gravel found on passing through this channel had a value from \$18 to \$20 per cubic yard. In the Doyle gravel mine, Superintendent R. B. Stanford reports to the independent that the shaft is down 85 feet. A boiler, 40 H. P., has been erected capable of supplying power for the steam pump which has the water under control. The sinking is in cement and three shifts are employed. The object of this shaft is to find the position and trend of the channel of the dead river in Table mountain. The Neubaumer mine is being operated by Manager Demarest, of Altaville, who is running a prospect tunnel on the east side of the canyon of the Stanislaus river that will give backs of 700 feet when the vein is cut.

At the Densmore the superintendent is busy getting ready to start up in full force when the water comes.

In the Soulsby mine the main 200-foot level is entered 350 feet north of shaft. Drifting has been resumed in the new shoot that was discovered lately. Work is being carried on entirely by steam.

In the New Era or old Page mine, near Five Mile creek, owned by Corlin Bros. & Pownall, they are drifting on the footwall from the tunnel level. A water power hoist is to be erected in the tunnel at the shaft. A chamber has been excavated under ground for the hoist. A compressor and baby power drills will be installed.

TRINITY COUNTY.

The Journal says there is a full force on the Midas, which is yielding about \$35,000 a month in gold. The Dorleska has a very rich lead and returns several thousands per month clear profit. The Chloride-Bailey is being actively and intelligently opened up and in the very lowest workings, about 800 feet below the surface, there is a well-defined lead about 12 feet wide, 2 feet of which will average \$45 per ton in gold, the whole lead running about \$25. The new 20-stamp mill and tramway is a success and dividends are in sight in the Chloride-Bailey. The Globe is another good property and a recent strike in the lower levels proves that to be a property of great merit. The Bullychoop is a big producer.

G. B. Lowdon has gone to the Three Peaks G. Co.'s property with twelve men to put up the 10-stamp mill recently purchased. The company has also bought a large water wheel and will utilize the water power to run the mill.

YUBA COUNTY.

The California Debris Commission opened eight bids for the construction of the first of the Yuba river barriers above

Marysville. The lowest was from the Atlantic, Gulf & Pacific Co. for \$27,940.50. All the bids will be forwarded to the War Department at Washington, and it will be a month before the contract is awarded. The work can then be begun, as all deeds to the land are now in.

C. L. Crane will put a 25-stamp mill at Camptonville, on the Honeysuckle. He is superintendent and part owner of the mine.

COLORADO.

ARAPAHOE COUNTY.

Denver reports that the Colorado Fuel & Iron Co. has voluntarily decided upon a general increase in wages to the 10,000 coal miners in its employ. The increase is in a way a readjustment and in some instances amounts to 25% of the present scale.

BOULDER COUNTY.

At Caribou the Anchor is driving a crosscut tunnel to cut the Anchor lode, under the management of M. Wolfe.

In the St. Louis mine, under the management of Trollope & Habrel, three shifts are at work; the mill is running steadily. The shaft will be sunk 400 feet.

In the Grand Island district the Denver Tunnel Co. is driving its tunnel to cut about thirty veins traversing Chittenden mountain, west of Eldora.

CHAFFEE COUNTY.

The Futurity M. & M. Co., near Newett, has in place a hoist, 35 H. P. boiler, 700 feet of cable. Twelve men have developed the vein 22 feet, showing 3 feet thick, averaging nearly 12% copper and 10% lime.

CLEAR CREEK COUNTY.

The Waltham Co. is putting in a new steam hoist at the mine near Russell gulch. The company has a wide body of sulphide ore and enough value has been taken from development to pay all running expenses.

The Con. Franklin has started a shaft to connect with the adit driven through the Silver Age and Franklin territory. The company is also driving the level below the adit to the west, and last month T. R. Grasser with a machine drill in twenty-six shifts drove 144 feet—the best record so far made in this section. About 1500 feet in from the mouth of the adit a shaft was sunk and at 100 feet another level was started west. This has been extended 900 feet, passing through two ore shoots.

Near Idaho Springs, the Little Mattie has driven an adit level 2000 feet to connect the Mattie with the Newton mine, both of which are operated by that company. Ore was taken out in the drifts to keep the sixty-ton concentrating mill running.

J. J. May is manager the Millard M. Co., to operate the New Year mine on Seaton mountain. The shaft is 95 feet deep. They are sinking on a body of \$40 ore 1 foot in width.

Manager T. B. Crow is unwatering the shaft on the Consolidated Alpine and will sink from its present depth of 300 feet. A new air compressor has been installed.

The United Power Co. will run its electric plant at Georgetown by water power all winter. A contract is to be let to drive a tunnel 400 feet in length to cut under Clear lake, thus preventing the outlet from freezing up.

The Burns-Moore tunnel has closed down because of lack of water. Manager Schaller says that a steam plant will be put in. The tunnel has been driven 1000 feet.

The Sun and Moon mine, on Seaton mountain, Clear Creek district, is being worked through a shaft and also through the Newhouse tunnel. The company will install machinery in the tunnel and drive an upraise to connect with the surface workings—1200 feet. The large vein cut in the tunnel has been drifted upon for a distance of 1500 feet. This vein and the ore bodies have proven permanent.

Empire announces consummation of the sale and transfer of the Union group of claims on Silver mountain, for \$35,000, to a company composed of railroad men and residents of Nebraska. An adit on the Union proper has penetrated over 400 feet and uncovered ore bodies upon which stopes are progressing that yield an \$18 per ton crude mill dirt, and ore of three-ounce grade in gold, with some copper.

Manager Williams of the Specie Payment mine has the old Champion mine, which adjoins the Specie Payment, on Bellevue mountain, in Clear Creek district. The Specie Payment has a production record of nearly \$500,000; the Champion property is equally rich. The property lies just inside of the boundary between Clear Creek and Gilpin counties; the ore taken out goes to Gilpin county, thus giving that county the credit for it. The Specie Payment property consists of seventeen claims and is at the present time producing about \$5000 per month.

Near Idaho Springs W. E. Renshaw,

owner Gem mines, is sinking the shaft at the Gem extension and is down 800 feet. Mr. Renshaw is also working the property through the Newhouse tunnel, night and day drifting and preparing to raise to connect with the shaft. The raise is started over 1000 feet west of where the tunnel cut the ore body.

C. J. Green has charge at the Ben Doran mine for the Swiss-American M. Co.

P. Mixsell tells the Post of a recent strike in the Gem Extension mine, about 2 miles from the portal of the Newhouse tunnel. This vein was intersected at a vertical depth of about 2000 feet, where it was found to be 20 feet wide. While the tunnel was being pushed on into Gilpin county Manager Renshaw began upraising upon the Gem vein from the tunnel level and drifting both ways on the lode. He cut a station 20 feet wide, 250 feet in length, as a base for stoping. As fast as the ground was worked out square sets of timbers were put in, platforms built for miners, tracks laid and the stoping continued. The ore thus broken down is shot into bins at the tunnel level and conveyed to the mouth, the smelting product loaded into railway cars for conveyance to Denver, the milling stuff taken by wagons to the Newton concentrator on Clear creek. While upraising the miners cut into a body of mineral 8 feet wide, all smelting ore. Mixsell says it is the largest and finest block of ore he ever saw in either Gilpin or Clear Creek county. In addition, Manager Renshaw has from 2 to 12 feet of milling ore and is producing about 100 tons a day. In a short time he will be breaking and sending out over 500 tons a day. He is using modern drills, and electric hoists for raising timbers and supplies to the men working in the upraise and stopes. The vein is opened up for 500 to 600 feet on either side of the Newhouse tunnel and there are reserves ready for stoping.

CUSTER COUNTY.

The Custer M. & R. Co., which owns the town of Custer City, Silver Cliff mining district, 50 miles south of Cripple Creek, owns, by purchase and location, fifty acres of mineral ground and contiguous locations covering about twenty acres additional.

DOLORES COUNTY.

The Mount Goram M. & M. Co., operating the Almont property, near Dutton, has an ore body, average assays showing fourteen ounces gold and 400 ounces silver per ton.

GILPIN COUNTY.

(Special Correspondence)—The Pewabic mine at Russell Gulch is being unwatered. The company has had surveys made for a wire rope tramway from the mine to Idaho Springs—a distance of 3 miles.

The Saratoga mine at Russell Gulch is producing about eighty tons of ore per day. The main shaft is being sunk and is about ready to start a crosscut on the vein at the 1000-foot station.

The Yankee Con. M., M. & T. Co., Yankee, expect to put up a new mill this winter. The old 5-stamp mill which they now have on the property has been running steadily since June, and they will operate it until the new mill is finished.

Yankee, Oct. 15.

On Quartz hill the deepest gold-bearing vein in the State, the California, has its shaft in 2210 feet.

The Kansas-Burroughs Con. M. Co., P. McCann manager, employs seventy-five men, a number of whom are leasers. The deepest workings are on the Phoenix-Burroughs shaft, down 1300 feet, C. Horning superintendent.

GUNNISON COUNTY.

Near Pitkin, A. Lejune, manager Blistered Horn tunnel, will drive a tunnel into West Gold hill in the Tin Cup district—1500 feet, size 4½x7 feet in the clear. The tunnel will cut across the Tunnel lode, Overland end lines, Little Mack, Little Hattie, Cyclone and into the Minnie Hall. All these claims as a block of ground show promise of low and high grade silver, gold, lead and copper ores. The tunnel will cut into the mountain to a vertical depth of 1000 feet. The ore bodies in the Minnie Hall have been probed to a depth of 800 feet with diamond drills and shaft, which has shown bodies of \$20 ore.

JEFFERSON COUNTY.

(Special Correspondence).—The smelter at Golden was closed down for a few days on account of shortage of limestone. The sampler is running steadily.

Golden, Oct. 16.

LAKE COUNTY.

Gough & O'Rourke, at the President property on Breese hill, have a body of siliceous ore, covering the face of the breast, which samples four ounces gold and fifteen ounces silver. The ore lies between walls of porphyry. The material is of a siliceous character and the smelter will take all of it that is offered.

OURAY COUNTY.

(Special Correspondence).—At the Red Mountain district, Iron ton, H. Nash and J. Carroll have sold their claims for \$40,000. The cash payment was \$7000. Mr. Nash is to be superintendent of the property.

Iron ton, Oct. 14.

The Morning Star, Sneffels district, has machinery for working its drills by electricity furnished by a gasoline engine. This property is owned by Ouray parties and has a paying vein of silver with a percentage satisfactory in gold. The owners will keep at work all winter. The Altoona, Governor, Ruby Trust and Humboldt, in the same district, are all working and will continue all winter. Each mine has laid in its winter supplies. L. B. Jackson, president Imogene G. B. M. Co., has a good force at work.

Superintendent Wood of the Portland group, owned by the Ouray Chief M. Co., 1 mile from the town of Ouray, has a 550-foot crosscut and 300 feet of drifting on the vein. The ore runs well in gold, silver, manganese and lead. It is the intention to erect a 50-ton concentrating plant, electric power, transmitted from Ouray.

Superintendent Hart of the Box Canon M. Co. is working on the old Stenographer property, a high-grade gold producer near Ouray, lying in the quartzite contact of the west side gold belt.

PARK COUNTY.

W. H. Hollingshead at Fairplay has leased the Hill Top mine from the Colorado & Southern Railway, and is working it with thirty men.

H. Dyatt of Leadville has a lease on the Peerless Maud and is breaking out fine lead ore.

The Cincinnati G. P. M. Co., the Lowe Placer Co. and the Snowstorm-Hyde Placer Co. have closed operations for the winter.

PUEBLO COUNTY.

The Colorado Fuel & Iron Co. denies the report that the company contemplates purchasing the Philadelphia smelter at Pueblo. The Philadelphia smelter was a Guggenheim property before its absorption by the American S. & R. Co. It has not been operated for some time, as the company has several other smelters in Pueblo, ample to handle the output of ore.

SAN JUAN COUNTY.

The Lady Ellen mill on Mineral creek is reported doing good work.

SAN MIGUEL COUNTY.

The third level of the Silver Pick mine, all the workings above that level, with the stamp and concentrating mill and tram, has been leased for three years to C. Toland.

A strike in the Blue Lake vein in Bridal Veil basin shows an assay of \$300 per ton in gold, silver and lead.

The Special Sessions group of mines on Mount Wilson is sold to Chicago men. The group comprises six lode claims and one placer. Several thousand feet of tunnels, stopes and drifts have already been developed and 5000 tons of ore blocked out. A mill and tram with necessary mining machinery will be put in.

TELLER COUNTY.

Most of the properties on Gold Hill are being worked by lessees in blocks and with few exceptions the miners engaged in this kind of work are making better than wages. The owners of the different properties, however, from royalties derived from lessees, with few exceptions, are using the money in developing their lower workings. It is thought that the trustees of the Stratton estate may lease the greater portion of that territory. If this is done, several hundred miners will be put to work. The Stratton M. & D. Co. owns a large acreage on Gold, Ironclad and other hills in the northern section of the district.

The reported sale of the Mary McKinney is not generally believed. Officers of the company say there is no truth in it. The Mary McKinney carries the longest continuous ore shoot of any mine in the Cripple Creek district—more than 2000 feet.

The Requa mill in Requa gulch is now worked under lease and is treating on an average of 100 tons of ore per day; as no roasters are used, the quartz must all be oxidized. The lessee is getting his rock from the various dumps about the camp and as the mill is not on the line of any of the railroads, it all has to be hauled in wagons. A fixed charge of \$4.50 per ton is made and to this \$1 must be added for hauling. If when sampled the ore does not run \$5.50 per ton, the miner will be out any part of the hauling charges above \$4.50. That is, if the ore runs \$5 he will have to pay 50 cents a ton on the freight. But quite often the rock runs \$10 and sometimes \$20, so that a handsome profit is made. As a rule, the mine owner charges 50 cents a ton flat on all ore that yields a profit.

In the bottom level of the Moose mine,

Raven hill, the entire level is lined with tin, making it perfectly air-tight and only permitting in it such wholesome air as can be breathed by a human being. The Moose has been troubled with a noxious gas; thousands of dollars spent in trying to get rid of it have been useless, and operations have been interrupted. The gas is so heavy that compressed air sent down to the level ascends through it without disturbing it. Carpenters and tinners were put to work, the levels squared up and back of the timbers the space was filled with rock and dirt; the tinners for a distance of 500 feet covered the woodwork; then asbestos was put on. Work is being pushed, and it is thought that so long as arrangements are carried forward that mining operations will go ahead just as though there were no gas.

Manager Weston of the St. Patrick Co. will explore the lower horizons of its property by diamond drills from the breast of the 700-foot level, the deepest working in the mine.

The Dillon claim, on Battle mountain, has been leased to the Sparr G. M. Co., of which M. Finnerty of Denver is the principal owner. It is also stated that a bond has been given on this claim for \$350,000.

Stratton's Independence maintains regular daily production of 250 to 300 tons. The property is working a full quota of men.

The Woods Investment Co.'s Economic mill, Eclipse gulch, is running 250 tons through every twenty-four hours. The ore is received either through the United Mines tunnel, from the Gold Coin, or over the F. & C. C. and Midland from the Bull hill properties. The Economic mill uses the Argall roaster, a device made up of four iron cylinders 30 feet long and 3 feet in diameter. The ore is received into one of these tubes, all revolving together, which in turn churn and recharn the ore as a hot-blast flame plays upon it. The ore is delivered in the direction of the flame into a head directly under the hottest part of the blast, and is then dumped out and carried into eight coolers, which are tanks 16 feet long and 5 feet in diameter, revolving in water. The ore is thus cooled and is delivered by means of a spiral feeder to the elevators to a floor above the chlorination barrels. Here it is received into automatic weighers having a capacity of ten tons each, and is ready to go into the chlorination barrels. Each barrel has a capacity of treating twenty tons of ore at a time and is so charged. From 1200 to 1400 gallons of water are used in filling each barrel to a depth of 30 inches. Four hundred and fifty pounds of sulphuric acid and the proper proportion of lime bleach is put in and the whole mass—ore, acids and all—caused to revolve from two to four hours. The liquidation now containing the chloride of gold is strained through filters into seven bleaching tanks, each having a capacity of 8000 gallons each, and left to stand thirty minutes. It is then drained off into settling tanks, where it again settles. The liquid is now ready to go into the precipitation tanks, as all the sediment and refuse have been caught either in the chlorination barrel, the leaching or the settling tanks. As the fluid is strongly acid, no pumps can be got to withstand the action of the chemicals; it is elevated by the law of displacement; air is forced into the lower tanks, which in turn forces the liquid up by displacement into the tanks, where the precipitation is to take place. The entire volume is then subjected to sulphuretted hydrogen, the chloride of gold broken up and a sulphide of gold ensuing. The sulphide still in the water is run through the filtering presses and collected. It is then subjected to heat in the refining room, the sulphur is driven off, the gold collected and retorted.

Mine owners in the vicinity of Beacon hill and the Buffalo & Cripple Creek M. Co. are discussing arrangements for the latter to run its Newell tunnel until it penetrates the main water course of Beacon hill.

IDAHO.

IDAHO COUNTY.

Elk City says the first cleanup of the Hogan property, near there, resulted in five bars of gold worth \$13,000. The cleanup represents about six weeks' run with a 10-stamp mill crushing 3500 tons of ore a day. It represented 3500 tons of ore sent through the mill. Hogan expects that the gold will run \$16 an ounce. If it does, they figure that they have saved \$3.90 a ton on the plates. It is locally stated that the cost of mining and milling has been 60 cents a ton. Nine men, a cook and Superintendent Hogan himself are doing all the work of mining and milling eighty tons of rock a day. Counting out the superintendent, who is one of the owners, that means a payroll of less than \$35 a day. The property is worked by water power.

The Copper King M. Co., in the Seven Devils country, has seven claims. The

Copper King is the one on which the work was done. A crosscut tunnel has been run 200 feet. It cut a vein at 80 feet which was 10 feet between the walls. The lead carries gold and silver values.

The Macey M. Co., consisting of Spokane men, is operating extensively at Paradise Flat, putting in machinery for sinking and running a wagon road from the property to Black lake, 6 miles.

The Black M. Co., near Black lake, has completed a 10-stamp mill and an aerial tramway for a distance of 2000 feet.

The Rankin General M. & M. Co is operating a gold property adjoining the Copper King. The company is preparing to put in a patent process mill to treat gold ores. The patent process consists of manufacturing acid for treating ore with compressed air and electricity. The acid is formed by generating electric sparks in an air-tight tank. The company is opening a wagon road to bring in machinery.

G. Hancock, superintendent White Knob mines at Mackay, is driving a tunnel to connect with the main ore bodies. When this is done the new smelter will start.

G. M. McDowell, manager of the company operating at Mineral, says the smelter is ready. He says when it is started, and everything in running order, he will employ seventy-five men constantly.

OWYHEE COUNTY.

The Avalanche says that W. C. Orem and associates of Salt Lake City, Utah, have bonded the Fourth of July group of claims on War Eagle mountain.

The Poorman mill will start again next week. The test run recently finished resulted in a brick valued at \$3000. The old tables have been taken out and cotters substituted.

The face of the long tunnel at the Addie is in pay ore 15 inches wide and carries values of \$25.

SHOSHONE COUNTY.

The Silver Cliff M. Co. at its annual meeting at Wallace shows that 1600 feet of tunnel and shaft have been completed at a cost of \$8 per foot. Considering the hardness of the rock, this is a cheap, long tunnel. Considerable shipping ore has been taken out of the upper workings; at the present time are taking out shipping ore from the long lower tunnel; assets in cash and supplies \$1640.45, no liabilities. It is the purpose to continue the development work until a mine is made.

Wallace says a satisfactory agreement was reached at the meeting of the directors of the Frisco mine. Issuing bonds of \$100,000 to pay off the indebtedness was ordered, and immediate preparations are made for starting the mine. Eighteen months ago the company had a debt of \$150,000, of which \$100,000 was due on account of purchase of the Black Bear mine and the loss of \$50,000 in operation. A contract was made with the American S. & R. Co. by which the Frisco Co. was to receive \$18,000 per month for eight months. That allowed the company to reduce the debt to about \$80,000. On Jan. 1, 1902, a new agreement was made by which the mining company received \$6000 per month from the trust; but last July no contract was made and the mine was shut down. President Hyman has since then furnished money to keep water out of the workings. In addition to the money advanced, the president holds a mortgage of about \$61,500 against the property. That amount, with the back taxes and the money due the Mine Owners' Association, the debt of the company, is about \$80,000.

The Spokane M. & M. Co. has filed a plat of the town of Government, in Government gulch, near the Crown Point, Silver King, O. K. and other producing mines, 3 miles west of Wardner. At present the postoffice is called Silver King.

MICHIGAN.

HOUGHTON COUNTY.

The Baltic produced considerable heavy mass copper this month. One piece weighing 1400 pounds was raised.

The annual report of Mine Inspector Hall shows that 14,130 men are this year employed by the mining companies in Houghton county, as compared with 14,498 last year. Fatalities underground during the year numbered 4; surface, 4.

MONTANA.

DEER LODGE COUNTY.

The Boston & Seattle, a new company, will operate Ontario claims, near Elliston. The Potosi M. Co., organized several years ago to develop gold-bearing ore bodies adjacent to Gold creek, has resumed work on its property.

FERGUS COUNTY.

Lewistown says the Whiskey gulch cyaniding plant of the Central Montana Mines Co., in the Judith mountains, under the management of C. T. Durel, is run at a small expense—as low as 65 cents per

ton for treatment. The bulk of the ore is from the Myrtle basin, on the west side of the hill from the plant, distant about half a mile. About twenty tons of ore per day is received at the plant from the Spotted Horse mine. Considerable sacking ore is being received from that property this fall. Fifty men pre-employed, two shifts working in the mines and one in the mill; capacity, 225 tons per day; 100 tons only are being treated at present, but with the completion of development work the plant will be run full capacity. The ore is easy of cyanidization; less than one-quarter of a pound of cyanide is used to the ton. Arrangements are being made to utilize the steam from the exhaust pipe to heat the mill.

Lewistown says that since the transfer of the Great Northern mines to the Gold Reef M. Co. the payroll has increased to \$3000 a month. New ground is being opened up and the mill is being overhauled. The management believes that the black ore in the lower levels can be treated by the cyanide process after being subjected to roasting. The tanks are enlarged to double the mill capacity.

Near Lewistown J. H. Meredith, superintendent New Year's mines, says the drying screens, thought necessary to put in owing to the dampness of the ore, will not be placed until next spring.

FLATHEAD COUNTY.

Six miles from Cabinet, Theriault, Skellow & Scott own the Gold Leaf claim. They have cut the vein at six different places and from the several openings have made tests of the value of the ore, which is \$60 per ton. The ledge is 12 to 14 inches wide, the walls being slate.

GRANITE COUNTY.

D. T. Conkling and D. Arms are working the Maddix claim, under bond, an extension of the Sunday mine. The Montana G. Co., which operates the Sunday, has taken out \$50,000 since April. A station has been cut at the 120-foot level in the mine, and the company is now drifting both ways, with ore in the face of each tunnel. It is expected that a new mill will be put in.

JEFFERSON COUNTY.

Near Boulder the Eikhorn mine is again to be shut down. The mine has been on the verge of closing down two or three times in the past year, but favorable arrangements were made with the East Helena smelter to handle the ore and large shipments have been made. The expense of keeping the water down, however, and the low price of silver have made the owners' efforts to operate at a profit unavailing. Miners have been leaving there for the past two weeks and only a few are now left. The pumps are being drawn.

W. A. Clark has suspended operations on the Mayflower mine, near Whitehall. The property has been dismantled and the machinery is en route to Anaconda. The ore of the property was very rich in places, some of it being worth \$10,000 a ton, yet it did not look rich. The larger part of that mined by Mr. Clark yielded \$300 per ton. Mr. Clark took from the Mayflower about \$1,500,000 above expenses of operation, and it is claimed that there is still in the workings considerable ore that will run \$20 per ton, but the rich ore shoots are exhausted. Having his own smelter, Mr. Clark was able to treat the product at a minimum cost. One feature in the expense account was the fact that there was very little water to contend with.

The New Boston M. Co. has been organized to work the Mohawk, Snowbird and Badger claims near Corbin. H. Freyler of Corbin has been appointed manager of the property. He will sink 200 feet on the Badger and crosscut the vein, which is 8 feet wide, with 2 feet of ore on the hanging wall. The ore assays 7% copper, eleven ounces silver and \$2.50 gold.

LEWIS AND CLARKE COUNTY.

The Columbian G. M. Co., at York, whose mill and cyanide plant were totally destroyed by fire a short time ago, will erect a 500-ton plant if there is sufficient ore in sight by next spring. During the winter developing the property will be continued.

The cyaniding plant to work the tailings, dump and ores of the Empire mine, west of Marysville, is in operation. The mill, erected last year, has been rebuilt at an expense of \$16,000. It is estimated that there are 12,500 tons of tailings in the dump.

MEAGHER COUNTY.

W. W. McDowell, lessee and manager of the Daly copper mine at Copperopolis, says a crosscut is being run on the 400-foot level toward the ore body which was worked about the 300-foot level.

PARK COUNTY.

Near Livingston the property of the Emigrant Gulch G. M. Co.'s property—placer claims and equipment—is sold to

D. L. Wing of Peoria, Ill., and G. A. Winslow of Livingston for \$6000. Wing & Winslow will start work and spend considerable money developing them.

NEVADA.

EUREKA COUNTY.

Ore shipments by rail from the mines of Eureka district, for the week ending October 17, were as follows: Bullwhacker, 45,200 pounds; Eureka Con., 88,690; Jackson, 33,080. From Hamilton—Rocco-Homestake, 109,740.

ORMSBY COUNTY.

The Delaware mine is reported rebounded for \$50,000.

WASHOE COUNTY.

H. L. Cowles of New York, treasurer and general manager, and C. B. Hill of New York, president Pacific Con. M. Co. of Reno, have returned after inspecting the property and arranging a plan of work. Superintendent Parry has twenty men, but will increase to forty.

WHITE PINE COUNTY.

A double-compartment shaft is begun at Copper Flat this week, under the management of J. A. Taylor, to be used exclusively as a working shaft, through which the ore will be hoisted and transported to the smelter.

Erection of the New York & Nevada C. Co.'s smelter at the Keystone has begun.

NEW MEXICO.

BERNALILLO COUNTY.

C. Wessells of Philadelphia has a new method of lead smelting. A plant built upon his designs is to be erected at Aberdeen.

LINCOLN COUNTY.

The Old Abe mine at White Oaks, the South Homestake near the same place, the Helen Rae at Nogal, and the Parsons group on the Bonita, have been secured by the Eagle M. & D. Co., made up of Chicago and Iowa men. An electric plant is to be installed at White Oaks.

In the American mine at Nogal miners are at work in a body of ore which averages \$10 to the ton.

In the Jicarilla district activity is shown, the new mines are being developed and old ones reopened.

OREGON.

BAKER COUNTY.

A contract is to be let for machinery for a 100 H. P. electric plant for the Tempest mine in the Greenhorn district. Thirty-five men are employed at this property. They are now in ore.

Forty men are engaged by the Red Boy company in construction of the dam and other preliminary work at the Olive lake water system. The dam will be 460 feet long at the top, 20 feet wide, 50 feet high, 60 feet wide at the bottom. It will raise the water of Olive lake. Two plants have been discussed for the water power now being arranged; one a mile from the hoist. This would leave the 2000 H. P. for the market and place the plant to be used for the Red Boy properties in close touch with the machinery where the power is to be applied. This feature will be left open until actual work begins.

In the Uncle Sam property Superintendent Hawley has sunk on the vein. The property will be worked during the winter.

G. Rodgers, manager Tammany mine at Cracker creek, owned by the Northwest M. Co., will do some extensive tunneling this winter.

By final payment of \$10,000 the Virtue Con. M. Co. of Baker City acquires the Virginia Con. adjoining at a price of \$40,000.

HARNEY COUNTY.

A find of white diamonds is reported from the vicinity of Harney, but nothing definite as to extent or value is known.

JOSEPHINE COUNTY.

Sixteen miles east of Grants Pass C. E. Ray has 150 men building a dam across Rogue river.

T. W. Draper, manager Oregon & Pacific Railway Construction Co., says that within thirteen months Grants Pass and Crescent City, Cal., will be connected by rail, to give an outlet for the product of the copper mines of the Waldo S. & M. Co. The same people are connected with the O. P. R. C. Co. At Takilma the Waldo S. & M. Co. have men developing the properties. The new railroad will cross the road at Grants Pass. It will run across the Illinois valley of western Josephine, touching at Selma, Kerby and Waldo, cross the State line and follow Upper Smith river, in Del Norte county, Cal., almost to Crescent City.

LANE COUNTY.

The Mountain Lion is an extension of the LeRoy and Helena veins. At a depth of 165 feet the ledge is 10 feet in width, free-milling ore; 14 inches of galena ore assays \$34.60 per ton; new tunnel is being

started to tap the vein 125 feet below the level of the old tunnel. The Crystal Con. M. & M. Co. owns this property.

The Sweepstake mine on Elephant mountain, in the Bohemia district, has 1000 feet of development work. A tunnel has been run 400 feet, crosscutting has been done 300 feet. Some ore running \$5 to \$50 per ton has been struck.

MARION COUNTY.

T. C. Culbertson says gold deposits are discovered 11 miles northeast of Gates, on the Little North Fork of the Santiam river. Nine claims have been located by T. C. Culbertson of Portland, F. E. Slater and G. H. Irwin of Salem. The claims are 3 miles above Elk born postoffice.

PENNSYLVANIA.

LACKAWANNA COUNTY.

In the anthracite coal mines every miner has an assistant apprentice known as his laborer. It is the laborer's business to load the coal on the cars after the miner has blasted and dug it out of the rock. For every car of coal the company pays the miner about \$1.05 (the price varies slightly in different mines). From this amount 40 cents a car is deducted as pay for his laborer. The miner must provide his own blasting powder, which costs him about 75 cents a day, he must keep his tools oiled and in repair at an expense of about 25 cents a day. Six cars a day, or a shift, is about the maximum an average miner and his laborer can load in a day. So, according to that, the miner earns in ten hours:

Six cars at \$1.05 each.....	\$6.30
Less laborer's wages for six cars at 40 cents each.....	\$2.40
Less blasting powder.....	.75
Less tool repairs and sundries..	.25 3.40

Balance, the miner's day's pay..\$2.90

The miner asserts that because he has to spend so much time in building props and in working in thin veins, and because cars are not given to him as fast as he can dig out the coal, he cannot and does not load more than three cars a day, so that \$2.90 must be cut in two before it can be a true statement of what he actually receives for his day's work; \$1.45 for ten hours underground is his version. He adds that he receives \$1.45 a day for 200 days in the year.

SOUTH DAKOTA.

LAWRENCE COUNTY.

(Special Correspondence).—The grade of the 500-ton mill is nearing completion at Terry and timber work started. The same company are equipping a compressor plant in Montana. They are operating their own property for fluxes for the smelter, and siliceous ores for the smelter are furnished from their own properties. Terry, Oct. 16.

Lead reports that the Hidden Fortune M. Co. has been sacking on an average a ton of \$1000 ore daily for the last month on the Otto Grantz claims, in the siliceous measures, where the ore is mined by stripping and quarrying. Churn drill holes have been put down over a large area. The richest is a quartzite gangue, lying next to the quartzite floor, being a decomposed substance, in which the free gold is intermingled. The company expects to take out enough ore to pay for the Hidden Fortune group of 284 acres. The fifth crosscut has been driven from the Baltic tunnel in the vertical slates to the Bingham vein. This crosscut is 1700 feet from the entrance of the tunnel.

In most cyanide mills of the Black Hills the consumption of cyanide potassium per ton of ore is about one pound. At the Wasp No. 2 mill, under the superintendency of C. C. Griggs, the consumption is one-half pound per ton, the Wasp ore being free from anything which interferes with the action of cyanide.

PENNINGTON COUNTY.

(Special Correspondence).—The National Smelting Co., Rapid City, are making exceptionally clean slags and a good grade of matte. They are handling about 150 tons per day.

Rapid City, Oct. 16.

Rochford reports the organization of the Golden West M. & M. Co. P. Train is superintendent. Three hundred acres in the Hornblend district have been bought. The principal work is on the Yellow Bird and the Benedict group. The plan is to sink on the Benedict and the Yellow Bird and to block out ore, then to put up a 100-ton mill.

UTAH.

JUAB COUNTY.

Work on the properties of the Victor Co. at Tintic is suspended till the litigation with Boss Tweed over ore bodies has been settled.

SALT LAKE COUNTY.

The Bingham Bulletin says work on the

Mount Aetna group of twelve claims, resumed in August, will probably be continued all winter under the management of J. A. Kauffman. Present developments consist of about 500 feet of tunnels and inclines, \$5000 having been expended.

The United States tramway, main section, is completed.

A 500 to 600-ton addition to Bingham's daily output is a result of starting up the United States mines. The present mine force, about ninety, will be increased to 150.

At Bingham, the Morning Star, Frisco and Zelnora groups have been acquired by the Bingham & New Haven C. & G. M. Co. They will drive the Morning Star tunnel, which has been driven 600 feet, to tap the main ledge at a depth of 500 feet below its apex, and continue from that station to tap the main Zelnora ledge at a depth of 900 feet.

The Highland Boy smelter has produced since October 1 nearly 1,500,000 pounds of copper bullion. It is thought that the Highland Boy management may come on the market for siliceous ores, as the excess in iron in the product coming from its own mines would enable the company to treat profitably outside ores such as those in the Tintic district.

The American S. & R. Co.'s Germania plant in this valley will be put out of commission about November 1. The new \$1,000,000 smelter is being got in shape for operation. The daily capacity of its equipment of furnaces is enough to handle all the ores now coming there.

SUMMIT COUNTY.

While sinking for water in Cherry Creek canyon the man in charge broke into a copper-bearing placer. A sample of the copper-bearing sands at Salt Lake shows the copper in native state. A mile east of the hole through which the placer was tapped R. McMichaels is developing a ledge in the sandstone, 4 feet between the walls, from which he is extracting ores 20% copper, 19 ounces silver.

From a 10-foot breast of ore in an upraise in the California M. Co.'s property at Park City, samples assay 40% lead and twenty ounces silver; \$5.60 gold per ton.

TOOELE COUNTY.

The tunnel by which the properties of the Honerline Co. and neighboring territory at Stockton is to be drained is in 1500 feet.

WASHINGTON COUNTY.

Near St. George, Manager G. Snyder of the Utah & Eastern Co. says the new smelter will be built as soon as materials and machinery can be hauled and mechanics can put it together.

WASHINGTON.

FERRY COUNTY.

Republic mine owners have offers to treat the ore from Tacoma and Vancouver. Mr. Breen of the Vancouver smelter offers to take 1000 tons of Republic ores per month at \$8 per ton freight and treatment.

W. R. Rust of the Tacoma Smelting Co. is figuring on getting a \$5 freight rate from Republic to Tacoma. If he can get this he will be willing to smelt the low-grade ore from Republic for \$2 per ton. This would apply only to ore carrying over 90% silica, as he would wish to use it for converter linings. If satisfactory arrangements can be made, he could use from 200 to 300 tons per month of this kind of ore. This would mean a \$7 freight and smelting charge. The rate offered by the Tacoma smelter is but 50 cents more per ton than the freight and treatment rate to the Granby smelter.

At Republic the Qulp mine has resumed operations under the superintendency of Robert Angus. It will break ore for shipment. There are between 125 and 150 miners at work in Republic. There are fifteen properties employing men.

OKANOGAN COUNTY.

A. M. Wehe is general manager of the Favorite G. & C. M. Co., to work ten claims on Ellemeham mountain, including the Roanoke property. The company will start a tunnel near the base of the mountain and run it 4000 feet to cut the ledges.

SKAGIT COUNTY.

The main tunnel of the Great Excelsior, in the Mount Baker district, near Hamilton, is in 285 feet. Fifteen additional stamps will be put in.

SNOHOMISH COUNTY.

The Hydro-Smelting & Refining Co. is erecting a 50-ton copper matting plant at Edmunds. The process involves the creation by the use of crude oil of carbon.

STEVENS COUNTY.

The Northport smelter is closed down—lack of coke.

WYOMING.

UINTA COUNTY.

Evanston says from the Ellis oil well on section 22, 5 miles from Spring valley, forty-five barrels of the high-grade oil were taken, and that the well refilled immediately 700 feet. The depth of the well is 1200 feet.

FOREIGN.

AUSTRIA.

The mercury mines are situated at Idria, in the Province of Carniola, and are a government undertaking. They have been worked upwards of 300 years, the third century having been completed in the year 1880. About 1200 workmen are in regular employment. The working day consists of eight hours if in the mine and ten hours if outside. The mine produces annually about 800,000 quintals of raw material. Three blast furnaces exist. Five thousand quintals of pure commercial mercury is produced, and 460 quintals of vermillion, per annum. The total revenue in 1870 rose to 2,000,000 florins, but in 1880 it fell to 385,000 florins. The latest statistics have not been published. From paragraphs that have appeared in the local newspapers it would seem that the mines are not working quite satisfactorily, and there is some talk of closing the works. Mercury has recently been discovered at Spizsa, in Dalmatia.

BRITISH COLUMBIA.

Shipments from the Rossland camp for the week ending October 18th and for the year to date are as follows:

	Week.	Year.
Le Roi.....	4,660	181,376
Le Roi No. 2.....	545	51,596
Centre Star.....	1,800	17,181
War Eagle.....	1,290	9,336
Rossland G. W.....	...	2,400
Giant.....	30	2,605
Cascade.....	...	300
Columbia-Kootenay.....	...	30
Bonanza.....	...	90
Velvet.....	60	860
Spitzee.....	...	20
White Bear.....	...	5
Totals.....	8,285	265,599

It is reported in Nelson that the erection there of a large lead refinery has been decided on by the C. P. R. R.

A shipment of about 5600 pounds of pig lead, the product of the silver-lead refinery recently installed in connection with the Trail smelter, has been laid down at Grand Forks at a total cost of 5½ cents per pound.

Grading is being done at Morrissey for the erection of 250 new coke ovens. Forty men are employed, to be increased to 100.

The Le Roi company has made a reduction in the cost of mining operations there. Manager John MacKenzie reports:

"The expenditure for the month on mine account was \$54,187. The cost per ton of breaking and delivering the ore on the railroad cars was \$2.40, a reduction of 47 cents, as compared with July. The cost of development including the deepening of the main shaft, was 74 cents, making the total cost of mining and exploration equal to \$3.14 per ton."

Shipments of first-class ore were 17,010 tons, averaging \$15, and 1568 tons of second-class ore from the dump, going \$11.81.

Fairview reports work on the 200-ton cyanide plant of the New Fairview Corporation, Ltd., progressing. Superintendent Ostenberg figures that he will save 88% of the value in the tailings when everything is ready to put in operation the 46-stamp mill and cyanide plant and there will be ore for crushing. There are now 6000 tons of broken ore in the stopes. At present one drill is sufficient to keep fourteen stamps running.

A two weeks' test, with fourteen stamps, on ore from the 300 level, gave the following returns: One hundred and sixty-eight ounces bullion, \$1630; 5 tons sulphurets, value per ton \$211, \$1055; 50 tons low grade concentrates, value per ton \$18, \$900; 600 tons tailings, value per ton \$3.70, \$2220; total, \$5805, giving a value of \$8.50 per ton. In addition to these values, about 10% was lost by being carried off in the slimes. A second run of ore from the same level of 846 tons and 454 tons from the second level, or a total of 1300 tons milled, resulted as follows: One hundred and thirty-seven and one-half ounces bullion, value \$1557.87; 7 tons sulphurets, value \$145 per ton, \$1015; 60 tons low-grade sulphurets, value per ton \$15.95, \$957; 1100 tons tailings, value per ton \$2.80, \$3080; total, \$6619.87, showing an average value of \$5.07 per ton in addition to slime losses.

Ymir reports the stamp mill and cyanide plant at the Second Relief running. Twenty-five men are employed.

Boundary mines are shipping ore at the rate of 1800 tons per day. The following

is the tonnage of the six leading mines for the week:

Granby mines, 5236 tons; Mother Lode, 4576 tons; Snowshoe, 1080 tons; Sunset, 610 tons; B. C. mine, 600 tons; Emma, 780 tons; total for the week, 12,888 tons. Total for the year to date, 372,377 tons.

On the Highland group, near Ainsworth, the mine has been leased to H. Cortiana, who has thirty-five Italians at work. The concentrator was started up this week.

LOWER CALIFORNIA.

W. F. McAboy, manager Thomas M. Co., has loaded barges at Yuma, Ariz., and goes down to the company's property, 150 miles from there. Several carloads of ore will be taken out and in thirty days the steamer Retta will go down after it. The company has a smelter at Redondo, where a test will be made of the ore.

MEXICO.

In a recent official report to the Mexican Government by Juan Fenochio, comandante third zone, La Gendarmeria Fiscal, regarding La Cananea, he says the principal mines now being worked are the Esperanza, Copete, Oversight, Veta Grande and Eliza, in which there are engaged 1187 men earning an average of \$3.50 gold daily. [This does not, of course, represent the actual wages of miners or laborers, because in the above average are included the salaries of the civil and mechanical engineers and other employees of more or less rank, and others holding high positions.]

For the extraction of ore and the working of these mines the following machinery is used: One 210 H. P. engine, five 44 H. P. gasoline hoists, six 44 H. P. steam hoists, two 110 H. P. steam hoists.

In addition to the mining operations there are employed in the other departments and offices, in the construction of new buildings, erection of new machinery, railroad service, etc., 2736 men, whose average daily wage is \$5 Mexican money. Among the 3925 employees above mentioned the following nationalities are represented: Mexicans, 2121 (54%); Americans, 1265 (32%); English, 132; Scotch, 17; Irish, 52; Canadians, 5; Germans, 62; Swedes, 22; French, 17; Italians, 17; Swiss, 2; Russians, 8; Chinese, 189; other countries, 14; total, 3925.

The smelter has at present six furnaces in active operation, reducing 1200 tons of ore every twenty-four hours and producing about seventy-five tons of fine copper. In this department and its annex are employed 1250 men, earning an average wage of \$5 Mexican silver for each eight hours of work, there being three shifts every twenty-four hours, and the same rule prevails in all departments in which the work never ceases.

The coke consumed by this department is imported from the United States, coming from the State of Colorado and Indian Territory; its cost at the smelter is \$23.30, Mexican money, per ton.

The steam power used in the smelter represents a total of 4500 H. P.

The ore concentrated comes from 2% to 4% of copper, and the concentrates assay from 30% to 40%.

At present but 750 tons are concentrated daily, using 350 steam H. P., but this department is as yet unfinished and is being rapidly enlarged.

The new power house contains several large engines employed in generating electric power for the cars which carry the slag to the dump, for light for the other buildings and the mining camp, as well as for motive power for the mud mill and the machine shops, and for the brick-making machine, generating a force of about 750 H. P. with a current of about 250 volts.

The main railroad line is of standard gauge, commencing at Naco, where it connects with the El Paso & Southwestern Railroad, passes through La Mesa and El Ronquillo and terminates at Los Puertecitos, where the same company has mines under development.

The Guggenheims are locally credited with having secured options on all the mines around Parral, Mex. It is reported that they control the importation of gold and exchange throughout the republic. It is reported options were secured in connection with a scheme in which the coinage of \$50,000,000 worth of silver will form a part.

SONORA.

C. H. Saunders is manager Gold Treasury Mines Co., Naco. Twenty stamps are being put in. The camp is 45 miles from La Cananea.

Cananea reports that Mexican troops or district police have taken possession of a group of copper mines, purchased some months ago by the Copper Queen Co. from Taggart, Morse, Jamison and others of Indianapolis. L. Lindsay secured a judgment from the court of first instance of Sonora, Mex., against the Indianapolis claimants on account of the alleged failure

to carry out a contract. The Queen Co. refused to give possession, hence the action of the troops. There were 150 men working and possession was given the soldiers without resistance. The mines are in the heart of the Cananea copper fields and embrace 250 acres; 7000 feet are under development. Lindsay is now in possession.

P. E. Murray, manager Zubiate mines, says the big stamp mill was burned on the 15th inst., loss estimated at \$60,000. D. R. Oliver, of San Francisco, is president of the company. It is thought a new mill will be built.

SOUTH AFRICA.

At Johannesburg the mines are nearly all running, but not to their full capacity, because native labor is so scarce. The mines have employed quite a number of ex-soldiers and pay them \$1.25 per day and board. At present the country is overcrowded with laborers, that is white laborers. But skilled labor commands the old prices.

THE KLONDIKE.

The Lewis River M. & D. Co. has moved down to Bonanza creek the dredger that was first used on the Cassiar bar, upper Yukon. At the Cassiar bar it was not a success, owing to the fact that the gold at that place seemed to be on the surface only, but at Dawson, when floated, such excellent results have been accomplished under the management of Mr. Elmer, that they intend to place a similar dredger at 16 Eldorado. In the Stewart River district, ex-Commissioner Ogilvie has been operating a dredger in the Stewart district this summer and he, too, will bring in another next year. Prospectors have been working from the headwaters of the Stewart to the Rocky mountains. In the last month three strikes have been made in the foothills of the Rockies and a large number of locations filed. Below Dawson, Wilson & Barrett are running a 250-foot tunnel to cut a ledge of galena on their claims. Bourden & Robinson have a 50-foot shaft on their Violet ledge and bonded the group to Eastern capitalists. The mill tests show \$3 in free gold and \$4 in concentrates.

About the Lapine and Rock Creek groups gold bearing quartz has been discovered. The Ladue Co. has bonded the Lapine property; a tunnel is being run into the ledge. Assays show gold values of \$8 a ton.

Personal.

F. G. MOODY has returned from Mexico to Salt Lake City.

M. PAQUIN has charge of the Bins M. Co., Ouray, Colorado.

ROBT. MEIN has returned from Nevada county to Oakland, Cal.

A. DYATT is in charge Toledo Avenue property, Leadville, Colo.

J. F. PARKS has returned to Jackson, Cal., from San Francisco.

A. J. MALLOY will develop the Paymaster group, St. George, Utah.

A. G. LAMSON has returned to Salt Lake City, Utah, from the East.

SAMUEL NEWHOUSE has returned from Europe to Salt Lake City, Utah.

J. B. TOMLINSON has returned to Prescott, Arizona, from a Sonora trip.

D. CLARK is general manager Waterloo Con. M. Co., Camp McKinney, B. C.

L. BINDER is superintendent Province & Del Oro G. M. Co., Zitacuaro, Mexico.

CHAS. WRIGHT is superintendent Central Montana M. Co., Lewistown, Montana.

WM. SCHWARTZ is general manager Santa Cruz M. Co., near Patagonia, Arizona.

F. E. WADE is superintendent the Globe Mining Company, Terry, South Dakota.

E. B. GAGE, president Tombstone Con. M. Co., Tombstone, Arizona, is in San Francisco.

F. GRAHAM is superintendent and manager Pride M. Co.'s properties, Montezuma, Colo.

H. W. TURNER is now manager Cherry Hill Gold Mines, Cherry Hill, Siskiyou county, Cal.

J. JOLLY has been appointed foreman Green Mountain Copper Co., Cripple Creek, Colo.

L. A. DURHAM, manager Clifton Con. M. Co., Clifton, Ariz., is visiting Salt Lake smelting plants.

C. G. LYNCH, manager Blinn Lumber Co., has returned from Clifton, Ariz., to Los Angeles, Cal.

I. M. BENEDICT, of Cripple Creek, Colo., will be superintendent the new Bingham & New Haven Copper & Gold

Mining Company, which has acquired the Morning Star, Zeinora and Frisco groups, Bingham, Utah.

J. F. BRADLEY, superintendent Halifax M. Co., has returned to Butler, Nevada, from Salt Lake, Utah.

A. J. BETTLES, general manager Newhouse interests, Utah, has returned to Salt Lake from Denver.

MARK B. KERR, general manager Jumper mine, has returned to Stent, Cal., from San Francisco.

W. H. SHOCKLEY, formerly superintendent Mount Diablo M. Co., Candelaria, Nevada, is at Tonopah, Nev.

J. S. DOUGLAS, superintendent Montezuma Cooper Company, has returned from the East to Nacozari, Mexico.

GEORGE H. KIRSCH, from Bisbee, Ariz., is in San Francisco for a brief time, and will return to Naco, Sonora, Mexico.

T. B. EVERETT, formerly of Placer county, Cal., is now interested in mining operations in Humboldt county, Nev.

F. H. PROBERT, who had been examining the Old Dominion property, has returned from Globe, Ariz., to Los Angeles, Cal.

W. H. NICHOLLS, president Nicholls Chemical Company, New York, has returned from a visit to Granby smelter, B. C.

J. CHYNOWETH, superintendent Fay group of mines, is appointed permanent superintendent of the Trimountain, Houghton, Mich.

J. R. JOHNS former manager Mollie mine, Aspen, Colorado, is in charge at the Mineral Farm mine, Smuggler mountain, Pitkin county, Colo.

E. H. BENSON, superintendent Black Warrior Copper Company Amalgamated, has returned to Globe, Arizona, from North Weymouth, Mass.

A. VAN DER NAILLEN JR. is appointed Commissioner of Public Works of San Francisco, to fill the vacancy caused by the death of G. H. Mendell.

F. J. CAMPBELL, manager Golden Cycle mine, has recently returned to Denver, Colo., from Europe, where he has been the past five months.

JAS. A. KERR, of the Kerr-Roberts Development Company, operating the Mammoth tunnel, has returned from Kansas City, to Idaho Springs, Colo.

F. KLEPETKO left New York for Peru on the 14th inst. He had been ill since leaving Montana en route to Peru, and, after two months' delay, took his doctor with him.

F. B. YOUNG, of Denver, succeeds T. B. Beadle as mill foreman Central Montana M. Co., Lewistown, Montana. The latter takes a like position with the Gold Reef M. Co.

F. K. BORROW has resigned his position of assistant manager of Contention mine, near Telluride, Colo., and goes to London, thence to South Africa, where a position awaits him.

H. SMITH, former superintendent of the Bullion-Beck mine, and later of the Centennial Eureka, Tintic, Utah, is at Tonopah, Nevada, and has charge of the Acenth mine.

C. E. UREN of the Eagle-Shawmut mine has returned to Tuolumne county, Cal., from Angela, where he had been making surveys of the Utica mine for use in the Lightner-Utica suit.

U. S. SENATOR PETTIGREW, of South Dakota, and U. S. Senator Butler, of North Carolina, are visiting the Cal. King G. M. Co.'s property at Picacho, Cal. The former is president of the company.

C. H. REPATH has resigned as chief engineer at the Washoe smelter, Anaconda, Mont. He will go to New York and engage in work for which he has been selected by F. Klepetko, manager Haggis-McCune smelting interests, Peru, S. A.

E. W. WILLIAMS, of the Speckle Payment, Idaho Springs, Colo., has returned from England, where he arranged with the directors of the Kohinoor-Donaldson company to resume operations on the Champion mine on Bellevue mountain and the Donaldson mine on Clear Creek, near Fall River, Colo.

Obituary.

COLONEL GEORGE H. MENDELL, president of the Board of Public Works of San Francisco, died in that city on the 19th inst. He was a native of Pennsylvania, born in 1831; entered West Point College in 1848, graduating four years later. During the civil war he served as topographical engineer on General Miles' staff, and later carried on the siege before Petersburg. He was retired from the army in 1895 by the age limit, and since 1900 served in a municipal capacity.

What the California Miners' Association Has Done—1892 to 1902.

Even those familiar from the beginning with the origin and ten years' labor of the California Miners' Association are apt to forget a good deal of the truth and fact of its history; to fail to appreciate its elements of strength, its value to the mining interests of the whole State—yes, to the entire Pacific coast—and its past successes. They are apt to also fail to realize the fact that its future career is bound to see an expansion and an increase of strength and activity proportionate to the wonderful growth and prosperity that we all feel is coming fast, not only to our own great industry here in California, but to the entire commonwealth of California. This State suddenly awakes to find itself fairly in the center of a great movement that is making the Pacific the main theater of the world's activity, and to a faith that it feels the beginning of a growth in population, prosperity and enterprise but vaguely dreamed of yesterday.

The mining industry is feeling a new thrill of life along with all other industries, and is partaking of the general spirit of enterprise and faith in the future. After a long time of tribulation and disaster, a great day is dawning here, and the California Miners' Association must be one of the great forces at work in that day.

The mining interests of every mining county owe loyal support to the banded miners of the State for two classes of reasons. There are the direct benefits, affording purely selfish reasons, and they should be strong ones, not only to the miner, but to every resident of a county in which mining is the chief industry. We are interested in the preservation of what hydraulic mining has so far won, and in the further aid that it will surely get, if strong and united efforts are continued. We are interested in saving to the largest industrial interest the mineral lands that mean a great deal to our future, and for the preservation and protection of which the California Miners' Association is persistently battling. We are interested in the land and mining rulings of the Interior Department, and our associated committees, when strongly backed by influence and prestige, are the strongest defenders you can find when oppressive rulings are made. We are interested in amending the federal mining law, and when it is amended the California Miners' Association will cut a big figure in the process. We are interested in any mining laws that the Legislature may pass. This Association has greater influence at Sacramento in this field than any political boss. We are and will be interested in many other things which the California Miners' Association will be potent to secure or regulate.

The questions are often asked: "What has the Association accomplished?" In answer it can be said: It secured the passage of the Caminetti act, under which over 400 licenses have been granted, permitting mines to work which otherwise would have remained idle.

It has secured an appropriation of \$800,000 from the Federal and State Governments to build dams to hold back debris in the Yuba river, to prevent the inundation of the valleys and the cities adjacent thereto.

It has protested against and prevented the patenting of millions of acres of land to the land-grant railroads, until the character of the land can be determined by an impartial jury.

It has secured the passage of many amendments to mining laws, and the enacting of new laws benefiting the mineral industry, and has used its influence to prevent the enactment of laws detrimental to the industry.

It was the first organization in America to urge the creation of a Department of Mines and Mining, with a secretary who shall be a member of the President's Cabinet, and it proposes to urge this matter until the department is established.

It collected and installed comprehensive mineral exhibits on the occasions of three great expositions, to-wit: The California Midwinter International Exposition, 1893-4; the Golden Jubilee Mining Fair in 1898, and the Paris Exposition, 1900. The first two were directly in charge of the agents of the Association, and were the means of directing vast amounts of capital to this State, and reviving the mining industry, which at that time was in a very stagnant condition. The Paris Exposition was encouraged and stimulated by the Association, inasmuch as the State appropriation was raised \$10,000 by the efforts of its officers, to aid the mineral exhibit.

It brought across the continent and royally entertained the members of the American Institute of Mining Engineers in 1899, and at that time published a volume, "California Mines and Minerals." These

two efforts of the Association alone have been the means of directing the investment of a large amount of capital in California, in several instances the investment being made through the officers of the Association.

It was the first to bring to light and agitate the great questions of the conservation and storage of flood waters, a movement that has stirred the nation with its magnitude, and which has resulted in the formation of many societies and organizations for this purpose.

It has published and spread broadcast over the entire English-speaking world, literature advertising the great mineral wealth of this glorious State, and it will continue to do so as long as the necessity for such literature remains and the people support the Association.

Its officers and committeemen have worked untiringly and incessantly for the benefit of the industry, and all for public spirited reasons, as not one of the officers or committeemen ever received a dollar for his services until two years ago, when a salary was voted to the secretary. It is for this reason that the California Miners' Association deserves the support and endorsement of every miner and mining man in this State.

The Association has had over 9000 members in the past. It should have 20,000 in the future—every one interested in mining and every miner in the State should be willing to contribute \$1 annually to an organization that is constantly and unselfishly working to promote the interests of the first and greatest industry in the State.

A statement of the finances of the Association for ten years, 1892 to 1901, inclusive, may be of interest to members—and is herewith given—in order that subscribers and members may judge if their money is being properly expended:

RECEIPTS.

San Francisco — general subscriptions	\$18,763 56
San Francisco — "California Mines and Minerals"	5,930 95
San Francisco—A. I. M. E. fund	4,517 50
Nevada county and Nevada county companies	10,078 00
Placer county and Placer county companies	5,408 70
Midwinter Fair quartz mill	1,500 00
El Dorado county	1,195 00
Sierra county	1,097 50
Yuba county	1,002 00
Badges	814 51
Butte county	632 50
Trinity county	626 00
Red Dog lawsuit subscription	550 00
Santa Clara county	382 50
Plumas county	374 50
Amador county	331 25
Calaveras county	275 00
Tuolumne county	234 75
Shasta county	230 00
Miscellaneous certificates	219 83
Alameda county	99 00
Siskiyou county	25 00
Sonoma county	14 00
Southern California branch	16 65
	\$54,318 70

DISBURSEMENTS.

Expense of Commissioners to Washington	\$17,829 47
"California Mines and Minerals"	5,857 83
Salaries, clerks and stenographers	5,122 12
Mineral land protests	5,375 38
Convention expenses	3,097 82
Entertainment of A. I. M. E.	3,562 49
Printing and stationery	2,449 80
Sundry expense	1,462 44
Office rent	1,436 10
Postage and telegrams	1,324 41
Red Dog lawsuit	1,087 60
Badges	797 65
S. K. Thornton	768 00
Delegates to Trans-Mississippi Congress	736 25
Donation Marysville Chamber of Commerce	250 00
Donation San Francisco Chamber of Commerce	250 00
Donation Native Sons	150 00
Donation Golden Jubilee fund	162 60
Polar Star lawsuit	25 00
Treasury	2,573 74
	\$54,318 70

Respectfully,
EDWARD H. BENJAMIN, Secretary.
San Francisco, Cal., Oct. 23, 1902.

Catalogues Received.

Catalogue No. 34 of the F. M. Davis Iron Works Co., Denver, Colo., is devoted to mining and milling machinery. The Davis standard crushing rolls are illustrated and described in detail, as are the Davis sampling rolls. There are several pages of scale drawings of Davis standard rolls, with full instructions for erecting them. The treatise will be sent to any address.

Mineral Statistics for 1901.

The annual volume on the mineral resources of the United States for 1901, prepared by Dr. David T. Day of the Geological Survey, has been sent to press and will be issued soon. An interesting feature of the report is a compilation of statistics, showing the number of working days lost in strikes in the coal industry. These figures include the present year and are brought up to date. The total number of days lost for the present year is placed at 2,000,000 days, compared with 733,802 days in 1901; 4,878,102 days in 1900 and 2,124,154 days in 1899.

The report places the total mineral product of the country for the year at \$1,086,529,521, a gain of a little more than 2% over the production of 1900. The gain was made in the non-metallic products and amounted to \$55,065,882, against a loss of \$32,156,909 in the metallic products.

As heretofore, iron and coal are shown to be the most important of our mineral products. The value of iron in 1901 was \$242,174,000, as compared with \$259,944,000 in 1900, and the value of coal was \$348,910,469, as compared with \$306,671,364 in 1900.

The value of fuels increased from \$406,359,351 in 1900 to \$442,395,304 in 1901, a gain of almost 9%. Every variety of fuel increased in value except petroleum, which showed an increase in quantity of 5,778,675 barrels, but a decline in value of \$9,571,978, due largely, the report states, to the less valuable character of the increased product of the new petroleum fields, as compared with the older fields.

Anthracite coal increased 9,021,207 long tons in output and \$26,746,169 in value. The average price of anthracite coal per ton at the mine was \$2.05—the highest figure obtained since 1899—and the average price per ton for bituminous coal at the mine was \$1.05—about 1 cent per ton more than in 1900.

Commercial Paragraphs.

THE Mine & Smelter Supply Co. of Denver, Colo., have orders for thirteen DeRemer water wheels in sizes of 4 feet, 5 feet and 6 feet.

THE Colorado Iron Works Co. of Denver, Colo., report the sale of a 40-stamp gold mill, erected complete for operation, to the Mojave G. M. Co., Needles, Cal.

J. W. COPELAND, Denver, Colo., has been appointed agent for Colorado for Wm. B. Scaife & Sons, Pittsburgh, manufacturers of the Scaife & We-Fu-Gu water softening and purifying system.

THE J. H. Montgomery Machinery Co. of Denver, Colo., have the following orders for machinery and supplies: Sixteen hundred feet surface gravity tramway for the British Columbia Gold Field, Ltd., Frank, Alberto Province, Canada; one carload of ore cars and automatic engine for the Stanley gold mine, Ketchum, Idaho; one carload of coal cars for Cedar Hill Coal Co., Rugby, Colo.; two carloads pipe line for the Highland Valley Power Co., Boise, Idaho, and a 50-ton cyanide plant for Leadville, Colo.

DURING the past few years there has been a number of plans evolved to prevent belts slipping on the pulleys. A successful one comes from Denver, Colo. The Hercules Pulley Covering Co., of that city, have the novel plan of covering the pulleys with a preparation of cement and thin layers of prepared paper, and it is stated, they are meeting with a ready sale and that the covering is doing more than they anticipated. The preparation is easy to put on smooth and is claimed to be harmless to either belt or pulley, not affected by either heat, cold, grease or steam.

THE S. H. Supply Co. of Denver, Colo., have made and occupy a position peculiarly their own in the handling of slightly used mining and milling machinery. One hundred and twenty-nine carloads of milling machinery from the Cripple Creek district since the first of the year from plants which are known to have been in operation from three months to a year; twenty-nine carloads now en route from Aspen, consisting of pumping, hoisting and air compressing plants which have been in actual operation from one to three years, secured from such mines as the Free Silver, started in 1897, the deep shaft, with its enormous Corliss hoist and duplex condensing pumps capable of 1000 gallons per minute 1000 feet high; nine air compressing plants, electrically and steam driven, with their full complement of drills, receivers and pipe, certainly illustrate the magnitude of their operations.

New Patents.

DEWEY, STRONG & CO.'S SCIENTIFIC PRESS PATENT AGENCY, 330 Market St., S. F., has official reports of the following U. S. patents issued to Pacific coast inventors:

FOR THE WEEK ENDING OCTOBER 14, 1902.
711,061.—**FLOW-J** W. Barnes, S. F.
711,379.—**FISH TRAP**—P. M. Benseth, Fairhaven, Wash.
710,949.—**SODA FOUNTAIN**—E. J. Calley, Oakland, Cal.
711,098.—**WAGON JACK**—G. J. Carr, Oroville, Cal.
711,259.—**STEAM GENERATOR**—L. D. Copeland, Los Angeles, Cal.
711,260.—**STEAM GENERATOR**—L. D. Copeland, Los Angeles, Cal.
711,261.—**STEAM GENERATOR**—L. D. Copeland, Los Angeles, Cal.
711,042.—**EXTENSION TABLE**—S. Dusenberry, S. F.
711,102.—**ROCK DRILL**—A. D. Foote, Grass Valley, Cal.
711,497.—**SAVING GOLD, ETC.**—F. M. Graham, San Jose, Cal.
711,157.—**HARVESTER**—G. W. Haines, Stockton, Cal.
710,981.—**SEPARATOR**—R. W. Jessup, S. F.
710,982.—**SEPARATOR**—R. W. Jessup, S. F.
710,983.—**SEPARATOR**—R. W. Jessup, S. F.
711,113.—**GAS COOKS**—A. E. Kraeger, S. F.
711,063.—**VISES**—McMahon & Lindgren, Spokane, Wash.
711,331.—**SLAG STEAM GENERATOR**—G. Mitchell, Naco, Ariz.
711,332.—**SLAG STEAM GENERATOR**—G. Mitchell, Naco, Ariz.
711,333.—**SLAG STEAM GENERATOR**—G. Mitchell, Naco, Ariz.
711,294.—**POULTRY FOUNTAIN**—F. Pohley, Windsor, Cal.
711,076.—**HYDRAULIC RAM**—J. Richards, S. F.
711,079.—**CHECK BLOCKER**—F. W. Smith, Campbell, Cal.
711,359.—**WOOD COUNTER**—T. A. Smith, Azusa, Cal.
711,453.—**TELEPHONES**—W. F. Smith, S. F.
711,135.—**WATER CLOSET**—J. Stewart, Los Angeles, Cal.
711,088.—**POTATO PACKING**—R. P. Vivian, Los Angeles, Cal.
711,144.—**MEASURING APPARATUS**—A. C. Wright, Berkeley, Cal.
711,450.—**WIRE FASTENER**—G. H. Wright, Spokane, Wash.

Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

HARVESTER—No. 711,157. Oct. 14, 1902. G. W. Haines, Stockton, Cal., assigned to the Houser & Haines Manufacturing Co., a corporation of Stockton, Cal. The purpose of this invention is to improve what are commonly known as "two-wheel" sidehill harvesters. The improvement consists in a method for raising either one of the driving wheels, as desired, and at the same time lowering the other one by means of long screws so connected with the axles of the driving wheels that said wheels can be adjusted at any desired height and held there. In this construction there is no need for the least possible waivable to the machine; it is staunch, perfectly adjustable and in every sense practical.

FLOW—No. 711,091. Oct. 14, 1902. J. W. Barnes, San Francisco, Cal. This invention consists in a flow, the combination of a moldboard having a groove along its lower edge, and a reversible share having symmetrically concaved sides, pointed ends, and a tongue on one edge of lesser length than the share, said tongue adapted to fit and lock in said groove.

WAGON JACK—No. 711,098. Oct. 14, 1902. G. J. Carr, Oroville, Cal., one-half assigned to Geo. M. Sparks, same place. The object of this invention is to provide a portable apparatus of simple construction by which the four wheels may be lifted simultaneously from the ground for purposes of washing, greasing, painting, repairing, etc. It consists of a wheeled base including longitudinal and cross bars; rock shafts journaled across opposite ends of the base and having their ends bent at right angles to form arms, a wagon-supporting frame carried by the arms, said arms at one end of the base being longer than those at the other end of said base; a centrally disposed lever fulcrumed at one end to one of said rock shafts; and links secured to the lever at a point between the fulcrum and outer end, said links diverging towards the sides of the wagon-supporting frame and secured to said frame at a point between the rock shafts.

POULTRY DRINKING FOUNTAIN—No. 711,224. Oct. 14, 1902. F. Pohley, Windsor, Cal. This invention consists in the combination in a poultry fountain of a horizontal tubular closed reservoir, hangers by which it may be removably attached to the upper part of a crate, and a reservoir parallel with and at a distance beneath the upper one, a water pipe extending from the bottom of the upper reservoir to a point beneath the surface of the water in the lower one, an air pipe extending from approximately the water level of the lower reservoir to the upper part of the upper one, the drinking openings in the upper part of the lower reservoir, said openings not extending to the ends of the reservoir where said ends form cup-shaped receptacles substantially as herein described.

ROCK DRILLS—No. 711,102. Oct. 14, 1902. A. D. Foote, Grass Valley, Cal. This invention consists essentially in a means for revolving rock drills by the action of an elastic medium therebetween. It consists in a novel arrangement of inlet and exhaust valves located close to the ends of the cylinder in which the piston of the drill reciprocates, and a means for opening and closing said valves by the movement of the piston transmitted directly to the valves and without exterior mechanism.

ATTACHMENTS FOR GAS COCKS—No. 711,113. Oct. 14, 1902. A. E. Kraeger, San Francisco, Cal. The object of this invention is to provide a simple and positive means for cutting off the gas when it is desired to extinguish the light. It consists in the combination of a gas cock, of a ratchet wheel fixedly connected therewith, a sleeve in which the plug is turnable, means for holding the sleeve stationary a spring pressed pawl pivoted on the sleeve, said pawl having one end adapted to engage the teeth on said ratchet wheel, means upon the other end of the pawl by which it may be operated to release the ratchet, and a spring having one end secured to a fixed point and the other end secured to the ratchet, said spring tending always to rotate the plug to close the cock.

Latest Market Reports.

SAN FRANCISCO, Oct. 24, 1902.

METALS.

SILVER.—Per oz., Troy: London, 23½d (standard ounce, 925 fine); New York, bar silver, 50½c, refined (1000 fine); San Francisco, 50½c; Mexican dollars, 44c San Francisco, 40c New York.

COPPER.—New York: Standard, \$10.65@11.00; Lake, 1 to 3 casks, \$11.55; carload lots, \$11.15; Electrolytic, 1 to 3 casks, \$11.50; carload lots, \$11.25; Casting, 1 to 3 casks, \$11.50; carload lots, \$11.25. San Francisco: \$14.00. Mill copper plates, \$17.00; bars, 18@24c. London: £53 5s 6d spot per ton.

LEAD.—New York, \$4.12½; Salt Lake City, \$3.50; St. Louis, \$4.00; San Francisco \$4.50, carload lots; 4½c 1000 to 4000 lbs.; pipe 5½, sheet 6, bar 5½c; pig, \$4.75. London: £10 15s per ton.

SPELTER.—New York, \$5.50; St. Louis, \$4.50; London, £19 5s 0d per ton; San Francisco, ton lots, 6½c; 100-lb lots, 7c.

ANTIMONY.—New York, Cookson's, 9½c; Hallett's, 8½c; San Francisco, 1000-lb. lots, 10c; 300 to 500 lbs., 11c; 100-lb. lots, 13@15c.

TIN.—New York, pig, \$26.25; San Francisco, ton lots, 27c; 1000 lbs., 28c; 500 lbs., 28½c; 200 lbs., 29c; less, 30c; bar tin, \$3.10, 32½c. London, £119 5s spot.

PLATINUM.—San Francisco, crude, \$18.00 per oz.; New York, ingot, \$19.00 per Troy oz. Platinum ware, 75@80c per gram.

QUICKSILVER.—New York, \$48.00 large lots; London, £8 15s; San Francisco, local, \$46.00 per flask of 76½ lbs.; Denver, \$49.75. Export, \$44.50.

BABBITT METAL.—San Francisco, No. 1, 10c; No. 2, 7c; No. 3, 6½c; extra, 17½c; genuine, 35c; Eclipse, 37½c.

ALUMINUM.—New York, No. 1, 99% pure ingots, 35c; No. 2, 90%, 30c to 34c.

SOLDER.—Half-and-half, 100-lb. lots, 18½c; San Francisco, Plumbers', 100-lb. lots, 15½c.

NICKEL.—New York, 50@60c per lb.; ton lots, 45@48c.

STRUCTURAL MATERIALS.

IRON.—Pittsburg, Bessemer pig, \$22.50; gray forge, \$20.00; San Francisco, bar, 3c per lb., 3½c in small quantities.

STEEL.—Bessemer billets, Pittsburg, \$31 and \$31.50; open hearth billets, \$33 and \$34.50; San Francisco, bar, 7c to 12c per lb.

CHICAGO CURRENT QUOTATIONS.

Bessemer.....	\$25.00@25.50
Foundry Northern 1.....	24.00@26.00
Northern 2.....	24.00@25.00
Northern 3.....	23.50@25.00
Southern 1.....	24.55@26.15
Southern 2.....	24.15@25.65
Southern 3.....	23.00@25.15
Forge.....	20.00@20.65
Charcoal.....	26.00@26.50
Billets, Bessemer.....	33.00@34.00
Bars, iron.....	1.85@1.95
Bars, steel.....	1.75@1.85
Rails, standard.....	28.00@30.00
Rails, light.....	34.00@40.00
Plates, boiler.....	1.90@2.00
Tank.....	1.75@1.80
Sheets, 26 store.....	3.25@3.40
No. 27.....	3.35@3.50
No. 28.....	3.45@3.60
Angles.....	1.75@1.80
Beams.....	1.75@1.85
Tees.....	1.80@2.00
Zees.....	1.75@2.25
Channels.....	1.75@2.25
Steel melting scrap.....	19.50@20.00
No. 1 railroad wrought.....	21.00@22.00
No. 1 cast, net ton.....	17.50@18.00
Iron rails.....	24.50@25.00
Car wheels.....	21.00@22.00
Cast borings.....	10.50@11.00
Turnings.....	14.50@15.50

CEMENT.—Germania, \$2.95; K. B. & S., \$3.10; Hawthorn, \$3.00; Trowell, \$3.00; Portland, \$3.35 per bbl.

LIME.—Santa Cruz, \$2.25; Roche Harbor, \$2.25 per bbl.

LUMBER.—(Retail): Pine, ordinary sizes, \$20.00@22.00; extra sizes higher; redwood, \$22.00@23.00; lath, 4 feet, \$4.25 @4.50; pickets, \$19.50; shingles, \$2.35 for No. 1 and \$2.00 for No. 2; shakes, \$13.50 for split and \$14.50 for sawed; rustic, \$26.00 @32.00.

NAILS.—Per keg (list prices): No. 20d to 60d, Wire, \$3.30; Cut, \$3.30; 10d to 16d, Wire, \$3.35; Cut, \$3.35; 8d, Wire, \$3.40; Cut, \$3.40; 6d and 7d, Wire, \$3.50; Cut, \$3.50; 4d and 5d, Wire, \$3.60; Cut, \$3.60; 3d, Wire, \$3.75; Cut, \$3.75; 2d, Wire, \$4.00; Cut, \$4.00. Special rates for carload lots.

GENERAL SUPPLIES.

POWDER.—F. o. b. San Francisco: No. 1, 70% nitro-glycerine, per lb., in carload lots, 15½c; less than one ton, 17½c. No. 1*,

60%, carload lots, 13½c; less than one ton, 15½c. No. 1** 50%, carload lots, 11½c; less than one ton, 13½c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2* 35%, carload lots, 9½c; less than one ton, 11½c. No. 2** 30% carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 725 kegs, \$1.50 per keg; less car lots, \$2 per keg.

CAPS.—3x, \$5.50 per 1000; 4x, \$5.50; 5x, \$5; Lion, \$2, in lots not less than 1000.

FUSE.—Triple tape, \$3.60 per 1000 feet; double tape, \$3.00; single tape, \$2.65; Hemp, \$2.10; Cement No. 2, \$3.00; Cement No. 1, \$2.65, in lots of 3000 feet and up.

CANDLES.—Granite 6s, 16 oz., 40s., 10½c per set; 14 oz., 40s., 9½c.

COAL.—San Francisco, coast, yard prices: Wellington, \$8.50; Seattle, \$6.50; Coos Bay, \$5.50; Southfield, \$8.00. Cargo lots, Eastern and foreign: Wallend, \$6.50; Brymbo, \$7.50; Pennsylvania, hd., \$14.00; Scotch, \$8; Cumberland, \$12; Cannel, \$9.00; Welsh Anthracite, \$13.00; Rock Springs, \$8.50, long ton; Colorado Anthracite, \$14.00. Coke, \$10.50 per ton in bulk, \$13 in sacks; Sunnyside, \$8.50, long ton.

CHEMICALS.—Cyanide of potassium, 98%—99%, jobbing, 27@28c per lb.; carloads, 25@26c; in 10-lb. tins, 38c; sulphuric acid, in carboys, 66% B, 2c per lb.; soda ash, \$2.00 per 100 lbs.; hyposulphite of soda, 2½@3c per lb.; blue vitriol, 5½@6½c per lb.; borax, concentrated, 7@8c per lb.; chlorate of potash, 12@13c; red sulphur, 3c; alum, \$2.00@2.25; flour sulphur, French, 3½@3¾c; California refined, 2@2½c; nitric acid, in carboys, 8c per lb.; caustic soda, in drums, 3@4c per lb.; Cal. s. soda, bbls., \$1.25 @1.50 per 100 lbs.; sks, \$1.05; chloride of lime, spot, \$2.50@2.60; nitrate of potash, in bbls, 8c; caustic potash, 10c in 40-lb. tins; sulphide of iron, 9c per lb.

OILS.—Linseed, boiled, bbl., 57c; cs., 62c; raw, bbl., 55c; cs., 60c; lard oil, 55c; cs., 55c; raw, bbl., 48c; cs., 53c. Kerosene—Pearl, per gal., 20c; Astral, 20c; Star, 20c; Extra Star, 24c; Eocene, 25c; Elaine, 22c; Water White, in bulk, 13½c; Mineral Seal, iron bbls., 19c; wooden bbls., 22½c; cs., 25c; Mineral Sperm, cs., 26½c; Deodorized Stove Gasoline, bulk, 17c; do., cs., 23½c; 86° Gasoline, bulk, 21c; do., cs., 27½c; 63° Naphtha or Benzine, deodorized, in bulk, per gal., 16c; do., in cs., 22c; Lard Oil, No. 1 bbl., 95c; cs., \$1.05; Neats-foot Oil, bbl., 70c; cs., 75c; No. 1 bbl., 52½@55c; cs., 57½@60c; Sperm, crude, 60c; Natural White, 65c; Bleached do, 70c; Whale Oil, cs., 55c.

WHITE LEAD.—Per lb., in kegs: Five tons and over at one purchase, per lb., 6c; 1 ton and less than 5 tons, per lb., 6½c; 500 lbs. and less than 1 ton, per lb., 7c; less than 500 lbs., per lb., 7½c; in 25-lb. tin pails, ¾c per lb. above keg price; in 1 and 5 lb. tin cans, 100 lbs. per case, 2½c per lb. above keg price. Dry Lead—In bbls., 1 ton and over, 6c; do. in kegs, 6½c.

RED LEAD AND LITHARGE.—One ton and over at one purchase, per lb., 6c; 500 lbs. and less than 1 ton, per lb., 6½c; less than 500 lbs., 7c.

ASSAY LITHARGE.—Per lb., 8½c.

BISMUTH.—Suhnitrate, per lb., \$1.60.

BONE ASH.—4c per lb.

BORAX.—Crystal, 7c; calcined, 25c.

CHROMIUM.—(90% and over) per lb., \$1.25.

COPPER.—Carbonate, 20c; Red oxide, 60c.

MANGANESE.—(90% and over) per lb., \$1.25.

MERCURY.—Bichloride, per lb., 90c.

MOLYBDENUM.—25c. 3 grammes; 1000 grammes—2½ lbs.

PHOSPHORUS.—(American) per lb., 80c.

SILVER.—Chloride, per oz., 75c; nitrate, 55c.

SODIUM.—Metal, per lb., \$1.00.

URANIUM.—Oxide, per lb., \$3.50.

ZINC.—Metallic, chemically pure, per lb., 50c.

ZINC.—Dust, per lb., 10c.

ZINC.—Sulphate, per lb., .04c.

(These prices are wholesale, f. o. b. San Francisco, unless otherwise noted.)

WANTED.—A man thoroughly familiar with the reduction of quicksilver ores, to take entire charge of mines and furnaces. Address, giving references, "Quicksilver," care of Mining and Scientific Press, 330 Market St., San Francisco, Cal.

THE CALIFORNIA DEBRIS COMMISSION having received applications to mine hydraulic process from Sidney S. Sturman, in Mamaluke Hill Mine, near Georgetown, El Dorado County, Cal., draining into Cannon Creek which reaches American River; from Peter S. Inneson, in Crystal Springs Gravel Mine, near Igo, Shasta County, Cal., draining into Clear Creek which reaches Sacramento River; and from Oliver P. Demuth and Henry P. Farnsworth, in Roosevelt Placer Mine, near Placerville, El Dorado County, Cal., draining into Irish Creek which reaches south fork of American River, gives notice that a meeting will be held at Room 36, Flood Building, San Francisco, Cal., November 10, 1902, at 1:30 P. M.

MINING AND SCIENTIFIC PRESS

Whole No. 2206.—VOLUME LXXXV.
Number 18.

SAN FRANCISCO, CAL., SATURDAY, NOVEMBER 1, 1902.

THREE DOLLARS PER ANNUM.
Single Copies, Ten Cents.

Centrifugal Dredging Pump.

Herewith is illustrated a centrifugal dredging pump built for the new dredger now being constructed for the port of Portland, Oregon, for dredging the Willamette and Columbia rivers. The port of Portland, after years of experiments with small dredging pumps, concluded that in order to maintain a proper depth of water in the 100 miles of the rivers which lie between Portland and the Pacific ocean, that it was necessary to build a mammoth dredger. Under the directions of J. B. C. Lockwood, consulting engineer, Seattle, Wash., a dredger having a length of hull 225 feet, a width of 42 feet and a depth of 11 feet has been constructed. After submitting specifications for public bidding the contract to furnish the machinery for this dredger was let to three different firms—the Willamette Iron & Steel Works of Portland, Or., receiving the contract for the pumping engines; the Oakland Iron Works of Oakland, Cal., received the contract for the hoisting engines, the cutter engines, and the swinging and spud engines, and for the furnishing and assembling of all the other machinery upon the dredger; and Knight & Co. of Sutter Creek, Amador county, Cal., received the contract to build the large centrifugal pump.

This centrifugal pump is 10 feet 10 inches in diameter, 2 feet 8 inches wide on the outside, and has an inside dimension of 10 feet in diameter and 22½ inches in width. The runner is 8 feet diameter and is made with a cast steel center, weighing about 3500 pounds, to which the sides are riveted. These sides are made of ¾-inch steel plates, which are securely riveted to the steel casting of the vanes and runner frame. The door on the suction side has a 30-inch elbow with a pipe leading to the ladder of the dredger and connected to the ladder gudgeon with a universal joint. The suction pipe leads down to the revolving cutter,

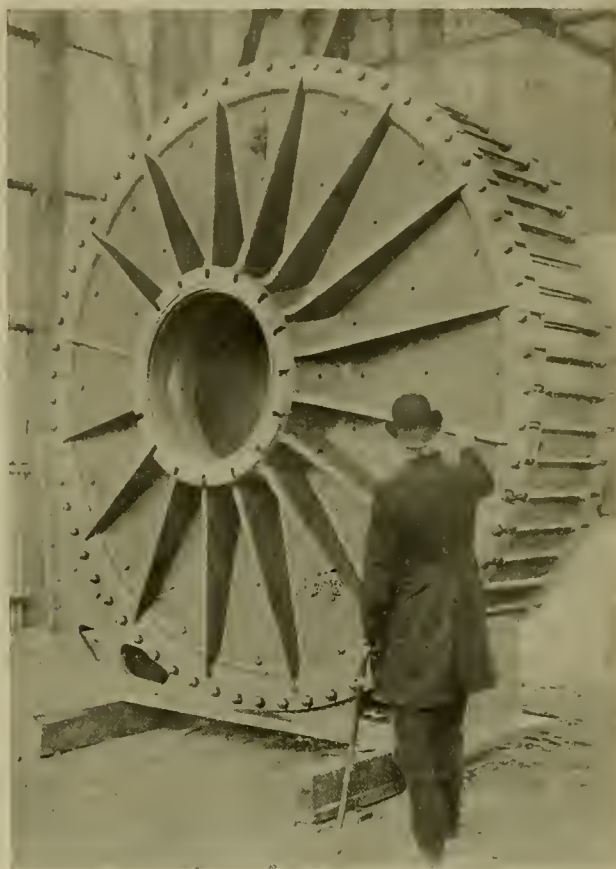
which is operated by twin compound engines stationed at the upper end of the ladder and so arranged that the raising and lowering of the ladder by the hoisting engines does not affect the working of the cutter engines. This ladder is 74 feet long.

It will be noted from the halftone that the pump is circular in shape. The object of making it a perfect circle is stated by the manufacturers to be with the intention of doing away with the pulsation that takes place in a volute casing, caused by the runner passing that part of the casing which is nearest to it. They state that another advantage of building the pump circular is in replacing the ¾-inch steel liners inside of the pump casing.

An idea of the size of this pump may be gathered from the fact that it is operated by a triple expansion 2000 H. P. engine. This engine has an initial cylinder 21 inches in diameter, intermediate cylinder 34½ inches in diameter, and two low pressure cylinders each 40 inches in diameter, all of 24 inches stroke. The engines take the steam at 165 pounds boiler pressure. The dredger has capacity of its full swing of cutting a channel 300 feet in width and is stated by the makers to be the largest and most powerful machine of its type in existence.

Individual Mortar Stamp Mill.

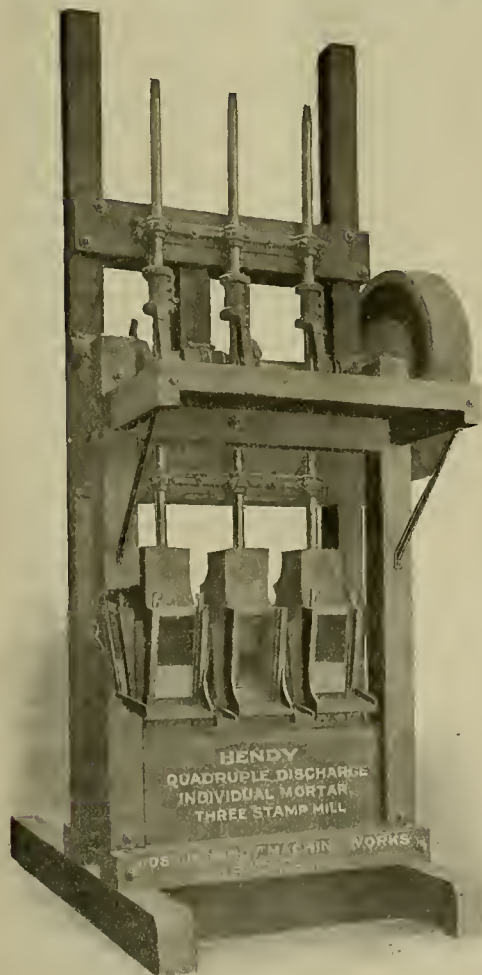
The photo engraving herewith illustrates a novel form of 3-stamp mill now being built and placed on the market by the Joshua Hendy Machine Works of San Francisco, Cal., devised by John H. Hendy. Application for letters patent has been filed. This device is designed to cover a simple, compact arrangement of the several parts of the general type of a stamp mill, by which each of the stamps does its allotted work of crushing in its own separate individual mortar. The mortars are cast with quadruple or four-way discharging or screen outlets, these outlets being through the two sides and the rear and front ends of each mortar. The two end mortars are cast with sluiceways along their sides nearest the battery frame, and as well along their respective rear ends (the latter not being shown in cut); these sluiceways being provided for the purpose of conveying the pulp, as discharged from the mortars, onto and over the mortar aprons, and thence onto the line of silver-plated copper plate sluices placed below and leading from the front of the entire battery. The other or opposite sides of these two end mortars, and also the two sides of the middle mortar, are each cast with a protruding lip below the discharging outlets, to direct the flow of pulp into two cast iron sluiceways, of suitable capacities and proper grade, which are placed as shown in engraving, so as to discharge also onto the same line of sluices in front of the battery, all of the pulp thus discharged through the four outlets of each of the three individual mortars being conveyed to a common point of final distribution. The three mortars are set side by side, parallel with each other, each bolted to and through a heavy cast iron foundation plate to a mortar block of suitable dimensions. The intent in devising and designing this method of construction is to combine certain important factors in an attempt to attain the maximum of crushing capacity, by the stamping process, viz: To provide for the independent action of each stamp in its own separate individual mortar, and to secure the largest



Centrifugal Dredging Pump.

possible screen discharging area. In providing the first it is argued that the operation of each stamp being free from any counteracting influence or obstruction and undisturbed by the conflicting action of any other stamps, a perfect regularity of the flow of pulp to and fro and out of the mortar will be secured; and if, then, the largest possible screen area, consistent with the proper disintegration or reduction of the ores, can also be secured, for the proper discharge of the pulp from the mortar, in a proper condition, at the proper time, the combination of these two factors would necessarily produce large crushing results. If to this combination there be applied effective crushing work of a heavy stamp, given a quick drop, then it is further claimed by the designer that the largest possible crushing results will be obtained, and that while this independent action of a single stamp, in its own separate, individual mortar, having a properly proportioned screening area, will thus produce a maximum of crushing effect or work, that the degree of fineness of the resulting pulp must also be more uniform and a minimum amount of slimes be produced. Reference to the engraving will show the manner in which this combination is designed to be effected. The method of the arrangement of its distinctive features indicates that this form of stamp mill has some novel points of interest, which will attract the attention of mining and mill men.

E. L. McKee, a U. S. postoffice inspector, has been through Arizona in quest of evidence to enable the Government to successfully prosecute some manipulators of fraudulent mining schemes, under the U. S. statutes forbidding the use of the U. S. mails to defraud. If Mr. McKee is in earnest he might find excellent hunting ground east of the Alleghanies. There are apparent opportunities in that direction in New York and Boston. Casual perusal of sundry publications would indicate opportunity to punish those who use the mails to obtain money under false pretenses from unsuspecting investors.



Hendy Quadruple Discharge Individual Mortar Three-Stamp Mill.

MINING AND SCIENTIFIC PRESS.

ESTABLISHED 1860.

Published Every Saturday at 330 Market St., San Francisco, Cal.

TELEPHONE, DAVIS 771.

ANNUAL SUBSCRIPTION:

United States, Mexico and Canada..... \$3.00
 All Other Countries in the Postal Union..... 5.00

Entered at the San Francisco Postoffice as second-class mail matter.

Chicago Office (Telephone, Harrison 73).....737 Monadnock Block.
 Denver Office (Telephone, Olive 733).....606 Mack Block.

J. F. HALLORAN.....Publisher.

San Francisco, November 1, 1902.

TABLE OF CONTENTS.

ILLUSTRATIONS.—Centrifugal Dredging Pump; Hendy Quadruple Discharge Individual Mortar Three-Stamp Mill; 37. Single Cylindrical Drum Engine; Double Cylindrical Drum Engine; Flat Rope Reel; Double Conical Drum, 251. Boats for Prospectors, 254. Mining and Metallurgical Patents, 255.
 EDITORIAL.—Early Rains in the Northwest; Wire Rope Transportation; Platinum and Its Associated Metals; Fuel Oil on Board Vessels; Price of Copper; Cripple Creek Drainage, 248.
 MINING SUMMARY—256-257-258-259-260.
 LATEST MARKET REPORTS—261.
 MISCELLANEOUS.—Centrifugal Dredging Pump; Individual Mortar Stamp Mill; Fraudulent Mining Schemes, 248. Concentrates, 249. Determining the Size of Hoisting Plants, 251-251-252. An Ingenious Theory; The History of a Catalogue, 253. Mineral Wealth of China; Introducing Solvents into Boilers; Boats for Prospectors; Platinum in Wyoming Copper Ore, 254. Mining and Metallurgical Patents, 255. Recent Mining Decisions; Personal; Commercial Paragraphs; Books Received; Catalogues Received; Obituary; New Patents; Notices of Recent Patents, 260-261.

ADVICES from all parts of the Northwest indicate unusually early rains, with corresponding snowfall in higher altitudes, presaging plentiful water for mining operations in the season of 1902-3.

SELDOM has the inventive genius of the American miner had more manifest success than in the adoption and adaptation of wire rope transportation, successfully solving the problem of cheap and reliable transportation where any other form of carriage of material was almost precluded. In San Miguel county, Colo., there are 30 miles of this airy telephage, stretched in some instances at a height of 13,000 feet. In Utah, Wyoming, Colorado, California and other sections they are of the greatest utility. One has recently been completed for the North American Co., owning the Ferris-Haggerty property, Grand Encampment, Wyo., which is said to be the longest in the world—16 miles between terminals. This is also described as being the only one ever built that connects two points neither of which is on a railroad, and as having in use double-tension stations, the latter made necessary because of unusual strain, at one point on the line the distance between towers being 2200 feet.

On page 231 of last week's issue appeared an extended notice of an extract from a bulletin of the U. S. Geological Survey on distribution of platinum and its associated metals, by J. F. Kemp. The conclusions of the monograph were that "experience thus far gained leads to the conclusion that platinum is very sparsely distributed in its mother rock and that the chances of finding it in quantities sufficient to mine are small. There is, nevertheless, a chance. If found, the recovery of the platinum by any means other than stamping and washing remains to be solved, and as the metal may be in a very finely disseminated state, this problem is a serious feature of the situation. Large and permanent placers are to be looked for only in very old land areas which have been subjected to protracted degradation and concentration. In the assay of antimonial, arsenical and other copper ores, but especially of tetrahedrite (gray copper or fahlerz), it is worth while to look for small percentages of platinum. Deposits of chromite deserve similar testing."

ADMIRAL MELVILLE has made a report on the use of fuel oil on board U. S. Government vessels, in which he sums up the following: That oil can be burned in a uniform manner. The evaporative efficiency of nearly every kind of oil per pound of combustion is probably the same. While the crude oil may be rich in hydrocarbons, it also contains sulphur, so that after refining the distilled oil has probably the same calorific value as the crude product. A marine steam generator can be forced to even as high a degree with oil as coal. The air requisite for combustion should be heated, if possible, before

entering the furnace. Such action undoubtedly assists the gasification of the oil product. The oil should be heated so that it could be atomized more readily. When using steam higher pressures are more advantageous than lower pressures for atomizing the oil. Under heavy forced draft conditions, and particularly when steam is used, the board has not yet found it possible to prevent smoke from issuing from the stack, although all connected with the tests made special efforts to secure complete combustion. Particularly for naval purposes is it desirable that the smoke nuisance be eradicated in order that the presence of warships may not be detected from this cause. The consumption of liquid fuel cannot probably be forced to as great an extent with steam as the atomizing agent as when compressed air is used for this purpose. This is probably due to the fact that the air used for compressing purposes, after entering the furnace, supplies oxygen for the combustion, while in the case of steam the rarefied vapor simply displaces air that is needed to complete combustion.

Price of Copper.

The probable price of copper in 1903 is of present interest, and many not gifted with the faculty of correct prophecy realize that the law of supply and demand will regulate the matter. To this paper it seems the copper consumption must increase, and that the present price will not be materially lowered. That this view is entertained by men long in the business of mining and selling copper is manifest by the extension of their operations and the betterment of their plants. This continuously increasing demand is the strongest factor in sustaining the price, for it is clear that any rigging of the market or juggling with stocks can have no effect other than temporary unsettling of values, and that the permanent solid thing about the business is the steady demand for copper in the industrial world.

For some time the price of copper was not fixed by the consumption, nor the cost of production, but artificially regulated around 17 cents per pound by stock manipulators independent of commercial conditions. Of course the inevitable occurred and anything in the way of a promising copper prospect was exploited with the result of a tremendous increase in the product, too great for even the extensive demand to meet. With the inevitable surplus came the inevitable reaction and break in prices. Then came also the prophecy that improved metallurgical processes would enable nearly every copper producer to turn it out at an average cost of half the then selling price. Even the clever effort to corner the market failed before such probability of cheapness, and the usual device of restricting production failed to sustain a falling market.

Effort was made about this time to approximately know the cost of production, but no general rule could be formulated, as so many factors entered into the question as to make it almost entirely a local one. It was, and is, evident, however, that, so far as the west half of the continent is concerned, the mine that produces copper "as a by-product" can market it the cheapest, for, however much may be manifest the triumph of metallurgy in such cases as the Atlantic mine of Michigan, where ore carrying but 1½% copper is mined and milled at a profit, yet the strength of the game lies with the property where the gold and silver yield pays all costs of production leaving the copper as net profit.

This was one of the delusions practiced in the days of 17-cent copper in the announcement of dividends from copper, in ignorance or defiance of the fact that in the case of great copper properties that produced gold and silver as well, in some cases, nearly half the dividends credited to copper should fairly have been credited to the gold and silver also derived therefrom.

So that the situation was that the stimulus of high prices increased production beyond possibility of present consumption and the baseless fabric fell. The swing of the pendulum the other way sent the price from 17 toward the 10 cent mark, and so it is only within the last year that the invariable and inevitable law of the business world has made all causes contribute to an even balance where steadiness of price becomes more likely.

While it does not seem probable that present prices

will go lower, it is manifest that those copper miners who are fortunate enough to have other metals in their matte will be least affected by any possible fluctuation.

Cripple Creek Drainage.

The manifest need of drainage of Cripple Creek, Colo., district has been discussed herein at length, and the economic effect of pumping or tunnel drainage gone over in detail.

The Cripple Creek mine owners have recognized that joint action is necessary, and a recent meeting of the mining interests went into consideration of the matter with the result that a deep drainage bore was endorsed and the committee report recommending such a tunnel was adopted.

The committee briefly discussed the pumping proposition. It was figured that 44,000,000 gallons would have to be pumped out to lower the standing level of the water in the district 1 foot; from this it was approximated that in addition to the cost of equipment and installation it would cost from \$1000 to \$1500 per foot to lower the water level by pumping, and the statement was made that one-half the total sum so required would produce the same result by tunnel drainage. The pumping plan would manifestly give quicker results, but the cost and ultimate requisites caused the committee to favor the general proposition of unwatering by tunnel.

It was estimated from reliable data that the amount of water drained for each foot in lowering the water level in the following years was:

	Gallons per foot.
1899.....	107,000,000
1900.....	77,000,000
1901.....	36,000,000
1902.....	44,000,000

Along this line the committee discussed several proposed tunnels, and with reference to the depth at which water stands in the different mines it was the sense of the committee in its report that a tunnel with a maximum length of 10,000 feet cutting at a depth of 500 feet below the present mean level of standing water would, on the whole, be most desirable, and so recommended. They figured that such a tunnel could be driven in two or three years, and that it would cost from \$25 to \$30 per running foot.

The report of the committee recommending the tunnel plan was adopted and a committee on ways and means appointed.

There was a unanimity of acquiescence in the committee's report and an expression of belief in the feasibility of relief in the plan proposed.

Having decided upon the plan to which the mine operators of the district are now committed, the question of cost, and how that cost shall be provided, comes up. While, of course, the cost—say \$400,000—cuts no figure in comparison to the extent and value of the interests involved, yet some clear-cut, definite, mutually hindering plan should be agreed to at the start. A joint company with power to levy assessments pro rata to the proportional benefit has been suggested, but in an undertaking of that kind involving so much time, it is questionable if such a plan would be a good one. Some would tire of paying assessments; changes of ownership would occasion legal quibbles, and the history of such co-operative plans is not encouraging. It were probably better to organize a separate company composed of those whose manifest future interests were largely bound up in making the tunnel a success, and that—present financial requirements being provided for—there be paid royalties. In one sense that would comprise "assessments," but not in the generally understood way of mining company assessments.

The deep tunnel plan deserves commendation. Ultimately the district will have to solve the problem some way, and the plan adopted by the mine operators offers the fewest objectionable features. The history of all such schemes is, however, one of vexation and delay, and the Cripple Creek operators will have to exercise due share of the patience that is a necessary element in everything relating to mining. The question will be successfully solved, for anything that stands in the way of a \$20,000,000 yearly gold production in so limited an area will, of course, be set aside and conquered, but the problem will be more speedily and satisfactorily solved by starting right. This the Cripple Creek miners seem disposed to do.

Concentrates.

A CUBIC FOOT of newly-fallen snow will weigh five pounds.

PROTOGENE is a variety of granite in which talc takes the place of mica.

ALLOWING 6 inches of topping, a mine car 9x4½x2 feet would hold 101.25 cubic feet coal.

THE horse-power of 1 inch water under 100-foot fall is .24147; of 40 inches, same fall, .96588.

A MILL SITE is not a mineral entry. The land so entered must be shown to be non-mineral.

ONE cubic foot atmospheric air, 60° F. temperature, barometer 30 inches, weighs .0766 pound.

TO FIX bolts in stonework a mixture of three parts sulphur to one part Portland cement is good.

SO FAR as known, the term "a harrel of copper" is used only in Michigan, and there means 900 pounds.

AN ore shoot is an ore body in place on the vein or lode. An ore chute is what the ore is sent through for handling.

TO SOLDER a piece of carbon and a piece of brass together, copper the carbon with a battery, then attach the brass with soft solder.

THE ordinary mercury loss in a 10-stamp mill should not exceed 15 pounds per month. A pound of quicksilver occupies 2.035 cubic inches space.

A LOCATOR of a mining claim can abandon any portion of his original location without forfeiting any rights he may have to the balance of the claim.

THE two largest stamp mills on the Pacific coast (excepting Alaska) are the Yellow Aster, Randshurg, Cal., 130 stamps; and the Golden Cross, Hedges, Cal., 140 stamps.

A RESERVOIR of 100 acres area would require an inflow of about ¼ cubic foot per second to maintain its height and counterbalance loss by evaporation; a 500-acre area, about ¾ cubic feet per second.

DYNAMITE (40%) is now selling at Butte, Mont., in carload lots at \$13 10 per 100 pounds; in 10,000-pound lots at \$13.60; in 5000-pound lots at \$13.85; in 2000-pound lots at \$14.10, and in 1000-pound lots at \$14 35.

A 10-STAMP BATTERY, dropping 1, 5, 9, 7, 3, 2, 6, 10, 8, 4, has given generally satisfactory result. Approximately, an ordinary concentrator day in and day out would require from 200 to 300 gallons water per hour.

TAKING the general average of service, quality and kind of ore, it may be said approximately that the wear and tear of shoes and dies is thirty-five to forty-five pounds, respectively, per 100 tons ore crushed.

IF eight persons make eight separate placer locations of twenty acres each, and seven of the locators convey their claims to the other, it requires annual assessment work of the value of \$800 to maintain possessory right to the claims.

BIARIUM SULPHATE is usually found in association with lead ores, though sometimes with manganese or copper. It is of widespread existence, occurring in beds and also in veins, but is mostly mined in Missouri and southeastern States. The annual production is about 50,000 tons.

WORK done on a ditch or canal may be applied to the representing of a number of contiguous claims held in common, if done for the benefit of such claims—that is, if it tends to the prospecting or development thereof, and is sufficient in amount to equal the necessary expenditure upon all the claims.

KNOWING the volume and velocity of the water, the necessary diameter of the required pipe can be determined as follows: Multiply the number of cubic feet of water by 144, divide the product by the velocity in feet per minute, divide quotient by .7854; the square root of the last quotient is the required diameter in inches.

IN putting on belting, it should be stretched as tightly as possible, and with wide belts this can be done best by the use of clamps secured firmly to each end of the belt, and drawn together by clamp rods running parallel with and outside the edges of the belt. There is no danger of breaking, as a belt 6 inches wide and three-ply thick will stand a direct strain of 5000 pounds, and others in proportion.

SPONGE LEAD is produced from litharge by placing it in contact with a sheet lead cathode in an electrolytic cell having a lead anode and dilute sulphuric acid as the electrolyte. The deposited hydrogen reduces the litharge, leaving a lead sponge of fine quality. This process is employed by the National Battery Co. at Buffalo, N. Y. The Electric Lead Reduction Co. of Niagara Falls, N. Y., is also producing sponge lead by subjecting galena to electrolysis.

WHERE the same person or company owns several contiguous mining claims capable of being advantageously worked together, and adopts one general system of developing them all, the value of the work done and improvements made pursuant to such system, whether done on only one of the claims or outside of them all, is available toward meeting the requirement of Section 2325 of the Revised Statutes relative to the expenditure of \$500 for each of such claims.

"CONCENTRATES" craves continued patience from some inquirers. 'Tis easier to ask questions than to

answer them, and some of the questions are twisters. Effort is made to give correct answer as soon as possible, but after all there is no obligation to wait, and if immediate speed as well as accuracy be demanded, doubtless the payment of a good round fee to some expert engineer, metallurgist, mechanic or lawyer might quicker elicit the desired information.

TO REMOVE PAINT from old oak, dissolve as much potash in hot water as the water will take, and, while still hot, stir in sawdust so as to make a fairly stiff paste. Spread this an inch thick over the wood, and after a few hours the paint or varnish will wash off with cold water. If necessary, the process can be repeated on any part. This will not hurt the oak, though it may for the time being give a whitish tinge; but rubbing over with hotted oil will restore the full natural color.

OFTEN belts are made uneven, and with the best of care, soon get out of shape. One sometimes finds a belt that ordinarily runs easy on the pulleys, suddenly inclined to run to either one side or the other of the driven pulley. Either the belt has been too slack or the load has been increased from want of lubrication or other cause. In either case it will run off if you insist on applying the power. The remedy would be to either take up the belt, thoroughly oil the journals or take off the extra load—maybe a combination of all.

A BOILER when about to be laid up for a season should be thoroughly cleaned on the inside, filled with water with steam on, so as to be full of hot water that has been boiled, up to the safety valve. The flues and fire surface of the boiler should then be cleaned; ashes and soot removed from every part where such lodge. Then close fire doors, ash pit, and put a cap on the smokestack. With this treatment laid-up boilers do not rust inside or outside. It is the moist air drawn through a laid-up boiler that does damage by rust.

THE gist of the decision in the Superior Court of Sutter county, Cal., wherein the validity of the Caminetti Act is assailed, is where the court held that the Cal. Debris Commission has lawful power to exercise any functions of a judicial character while acting in the interests of hydraulic mining, that the power relates only to those persons who voluntarily place themselves within its jurisdiction, and that its actions or orders or judgments can not bind any one else; that it has no jurisdiction over parties claiming to be injured directly or indirectly by hydraulic mining operations.

A ROCK is defined as an aggregate of minerals. A mineral is a naturally occurring chemical compound and therefore has a definite composition and belongs to a particular crystalline system. A rock being a mechanical mixture of different minerals has no definite chemical constitution. For example, granite is an aggregation of the minerals quartz, feldspar and mica. Granite, therefore, has no definite chemical composition. Petrology, or lithology, as the science of rocks is variously known, is in an indefinite condition. New terms are being coined and old terms are being assigned new meanings, so that one who does not keep up to date is frequently confused when reading current treatises on rocks.

THE cost of a telephone plant can be estimated, approximately, on a basis of the number of telephones installed. An exchange of 500 telephones installed within a radius of 1½ miles and no conduit or cable work, but up-to-date construction, will cost, approximately, \$65 a telephone, or \$32,500. As the number of telephones increases the radius or distance from the exchange will also increase, and therefore the cost. In estimating on 1000 telephones installed one must take into consideration some aerial cable and more substantial construction and more costly equipment. Therefore there would be a material increase in the cost per telephone, without conduit work. A safe approximation would be \$85 per telephone, or \$85,000 for the plant, within a given radius.

CARBORUNDUM is carbide of silicon. It is an abradant, harder than emery, and is used for the same purpose as the latter. It is made into wheels, into tools of various forms, and into hones. The process of manufacture consists in heating electrically, to a very high temperature, a mixture consisting of 60% pure sand and 40% powdered coke. To this mixture is added a small amount of common salt, and sufficient sawdust to render the mass porous, so that gases, which are liberated in large quantities, may escape. This mixture is packed around a core of coarse granulated coke, the grains having diameters of from ¼ to ½ inch. An alternating current is sent through the core and produces heat, which does not easily escape through the surrounding mixture. The result is a great temperature elevation and the formation of the carbide, some of it being in the form of beautiful violet colored crystals.

THE cost of sinking an incline shaft, following the dip of the vein for from 100 to 300 feet in depth does not usually exceed the cost of a vertical shaft 5%, and rarely 10%, time, labor, material and all things considered, while every foot sunk upon the incline shaft, providing the vein is not irregular in its dip, proves the magnitude of the ore therein and affords better opportunities for drifting upon the ore bodies disclosed. There are instances where incline shafts have been sunk at considerably less cost, and have been and are being used as the main working shafts, at a cost not exceeding the operation of vertical shafts of depths not greater than 500 feet. Having attained a depth of 500 feet, approximately, and having drifted at various levels into or along the ore shoot upon which the incline shaft in all probability has

been sunk—having demonstrated by such development work the average length and width of an ore shoot or shoots to such depth, and the trend of the same—if the magnitude of the ore bodies and the value of the same, as determined by those competent to render such determinations, are sufficient to justify the cost—then might a more economic and systematic plan for future operations of the mine be formulated and put into execution.

THE Comstock, Nev., lode was first discovered as a gold mine, although the subsequent discovery of sulphurets of silver among the gold eventually made it the first silver mine in the United States. But it was not until the fifth year that silver predominated over the gold, the yield for that year being: Gold, \$4,940,000; silver, \$7,460,000; total, \$12,400,000. Its greatest product in any one year was during the honanza days of 1877, which recorded a yield of: Gold, \$14,520,614.68; silver, \$21,780,922.02; total, \$36,301,536.70. This is taken from the official Government report, Treasury Department, Washington. Afterward gold again predominated, the yield for 1885 being: Gold, \$1,729,531.25; silver, \$1,415,071.04; total, \$3,144,602.29. Gold has continued to predominate each year since. The total yield of the Comstock to date is officially given at about \$370,000,000, over \$200,000,000 being silver.

ONE CUBIC FOOT of oil containing 6.2 gallons, weighing 7½ pounds per gallon, equals 48.05 pounds of oil. The theoretical amount of air required to burn 1 pound of oil is 15 pounds. One pound of air contains 13.2 cubic feet. Multiplied by 15, the lowest number of pounds of air that will furnish the necessary oxygen to burn 1 pound of oil equals 198 cubic feet of air required to burn 1 pound of oil. One hundred and ninety-eight multiplied by 48, the number of pounds of oil per cubic foot, equals 9504 cubic feet of air to burn 1 cubic foot of oil. At this ratio oil must be expanded to 9500 times its normal size before it is of equal density as that of the lowest amount of air actually required. And as the amount of air admitted is generally greater than what is actually used, this estimate is conservative. By feeding oil in a spray with steam, the weight of the two is greater than that of the two alone, as by the action of heat steam is changed to oxygen, which can be utilized in the process of combustion.

A DECAPOD ENGINE has ten driving wheels. The biggest "decapod" is owned by the Santa Fe Railway Co. It is an oil burner, and is guaranteed to haul 2100 tons up a 50-foot grade. The engine, minus the tender, weighs 137½ tons. On the drivers there is a weight of 230,000 pounds, or 115 tons. To the top of the stack the height is 15 feet. The boiler at the smallest ring measures 78 inches in diameter; at the largest ring, 88 inches. The firebox is 9 feet long and 79 inches wide. In the boiler there are 413 flues, each having a diameter of 2½ inches and a length of 18 feet 6 inches. The wheel base is 20 feet; total wheel base, 28 feet 11 inches; total wheel base of engine and tender, 62 feet. The cylinders have a stroke of 34 inches. The diameter of each of the driving wheels is 57 inches. The machine stands 15 feet 6 inches above the rail, the dome and stack being about the same height. The tender has a capacity of 7000 gallons of water and 2250 gallons of oil. The total weight of the engine is 262,000 pounds and of engine and tender 363,000 pounds, steamed up and ready for service.

THE question, "Does gold grow?" depends entirely upon the sense in which the word "grow" is used. The word is properly applied only to things possessing organic life, either animal or vegetable. It is improperly used in designating increase of size, as when we say a stream is growing larger, or a sandbar is growing. We mean by this that they are increasing in size, but not that the increase is due to life, as is a tree or calf, when they grow. Gold nuggets undoubtedly increase in size, and gold is being constantly deposited in rocks and veins and placers, but the increase in size and the deposition are due to mechanical and chemical action, and not to life growth. Many waters which percolate through the earth's crust contain gold in solution, and this gold, when it meets proper precipitants, is deposited. That precipitant may be an earth current of electricity, some vegetable growth or chemical in the rocks. It has been claimed that the nuggets found in placers are accumulations from the waters that percolate through the gravels, and are not from decomposed quartz as generally supposed. Those who so hold cite the fact that in the center of nuggets can be often found a small grain of iron sand. This was the nucleus around which the earth current of electricity deposited gold from the waters, just as it is deposited in electro-plating. During long ages this influence was at work, little by little increasing the size of the nugget, until they become much larger and purer than any ever found in veins or ore. Gold has frequently been deposited in mine timbers which have long been immersed in mine water. In the California State Mining Bureau museum there is a specimen of a piece of jointed cap and post taken from the Comstock, where it had been under water for years, in which gold has been deposited in the joints and pores of the wood. It is a well known fact that organic matter is a good precipitant of gold. Charcoal is used as the precipitant of the gold from the chlorine or cyanide solution. It forms an item in the constitution of sea weeds, which have taken the gold from ocean waters. But all this deposition of gold is not life growth. It is only a dead, inanimate accumulation, no more to be called growth than the accumulation of sand in a heap by wind or waves is to be called a growth of sand.

Determining the Size of Hoisting Plants.*

By EDWARD B. DURHAM, E.M., Trenton, N. J.

It is often necessary to calculate the size of a hoisting plant required to raise a given quantity of material, either as a preliminary to the detail design of the machinery, or to decide whether machinery on hand or offered by a manufacturer is adapted to the work to be done.

The first element of the problem to be determined is the load to be raised. In a mine that is already developed this is limited by the size of the car that can be hoisted out of the mine and that will pass through the underground gangways. If these place no limits on the design, the size of the load will depend on the output desired per day and on the number of hoists that can be made per day. The latter are fixed by the time required per hoist and the number of hours available for hoisting, after deducting from the working day the time required for raising and lowering men, sending down supplies, and for the many small delays in handling cars. It must also be decided whether the hoisting is to be done in one shift or in all of them.

As an example, assume an output of 400 tons per 10 hours; shaft, with two compartments, 1000 feet deep; hoisting in balance; time available for hoisting, 6 hours; engine can hoist load in 1.5 minute, and time to change cars 0.5 minute (the change at top and bottom of shaft being made at the same time). Then, 30 cars can be raised per hour, or 180 cars in 6 hours. This would require cars of 400 ÷ 180 = 2.22 tons capacity to handle the desired output.

With a single shaft, the time to raise one load is the time to change or load cars at the bottom, hoist loads, change cars, or dump at the top and lower the empty cars, while in a double shaft two cars could be handled while the above programme was being carried out in a single shaft, as the second load would be raised while the first empty was going back down, and changing of cars at the top and bottom would be going on simultaneously.

ROPES.—Having settled the size of the useful load to be hoisted, the size of the rope must be determined. This must be strong enough to hoist the total load, including its own weight, and to withstand the starting stresses due to picking up the load suddenly when the rope is slack. Experiments have shown that in starting with 6 inches of slack rope the stress in the rope is about double that due to picking up the load gently. Expressing these stresses in a formula, let

K = stress in rope in pounds, at the head sheave, at the instant of picking up the load.

W = weight of gross load in pounds.

R = weight of rope in pounds.

F = friction in pounds. = weight of all moving parts multiplied by f.

f = coefficient of friction.

Then $K = 2W + R + F$. (1)

This stress should not exceed one-seventh of the ultimate strength of the rope. The coefficient of friction f may be taken as .01 for vertical shafts and as .02 to .04 for inclined shafts with rope well supported on rollers.

As an example, required to find the size of rope necessary to hoist a total load of 5000 pounds from a vertical shaft 1500 feet deep. Assume, for a trial solution, that rope weighs 2 pounds per foot. From equation 1, $K = 5000 \text{ pounds} \times 2 + 1500 \times 2 \text{ pounds} + .01 \times 8000 \text{ pounds} = 13,080 \text{ pounds}$, and ultimate strength of rope should be $7 \times 13,080 = 91,560 \text{ pounds}$, which would require a 1½-inch diameter flexible cast steel rope, having an ultimate strength of 100,000 pounds and weighing 2.45 pounds per foot. This weight would increase R in above equation and make $7 \times K = 96,285$, which is still less than the ultimate strength of the rope chosen. If a lighter weight rope is desired, a plow steel rope could be used instead of the cast steel.

If the shaft is inclined, the stress in the rope due to the weight hoisted will vary with the sine of the angle of inclination, thus:

$K = (2W + R) \sin x + F$, (2)

in which x is the angle of inclination. Here the friction is also affected by the slope, and varies with the cosine of x, or $F = f(W + R) \cos x$; f may be taken as .02.

In the following discussion the loads will be considered as being hoisted from vertical shafts, as the principle remains the same for both classes, the only difference being that the stresses in the rope and on the engine and other parts of the machinery change with the changes in the slope.

DRUMS.—The minimum diameter of the drums is determined by the size of the rope used, and the larger the drums the smaller will be the bending stresses and the more strength will be available for useful work.

William Hewitt has shown that, when the diameter of the sheave or drum is 44.5 times the diameter of a

TABLE I.—HOISTING ROPES = 6 STRANDS OF 19 WIRES EACH.

Iron.			Cast Steel.		Extra Strong Cast Steel.		Plow Steel.		Proper Working Load..	
Estimated Weight per Foot in Pounds.....	Approximate Circumference in Inches...	Diameter in Inches.....	Approximate Breaking Stress in Pounds....	Maximum Safe Stress in Pounds = $\frac{1}{3}$ Ultimate Stress.....	Approximate Breaking Stress in Pounds....	Maximum Safe Stress in Pounds = $\frac{1}{3}$ Ultimate Stress.....	Approximate Breaking Stress in Pounds....	Maximum Safe Stress in Pounds = $\frac{1}{3}$ Ultimate Stress.....	Approximate Breaking Stress in Pounds....	Maximum Safe Stress in Pounds = $\frac{1}{3}$ Ultimate Stress.....
8.00	7.62	2 1/2	156,000	52,000	312,000	104,000	416,000	138,667	416,000	138,667
6.30	6.62	2	124,000	41,333	248,000	82,667	330,000	110,000	330,000	110,000
4.85	5.00	1 1/2	96,000	32,000	192,000	64,000	256,000	85,333	256,000	85,333
4.15	4.50	1 1/4	84,000	28,000	168,000	56,000	222,000	74,000	222,000	74,000
3.55	4.00	1 1/8	72,000	24,000	144,000	48,000	192,000	64,000	192,000	64,000
3.00	3.50	1 1/8	62,000	20,667	124,000	41,333	164,000	54,667	164,000	54,667
2.45	3.00	1 1/8	50,000	16,667	100,000	33,333	134,000	44,667	134,000	44,667
2.00	2.75	1 1/8	42,000	14,000	84,000	28,000	112,000	37,333	112,000	37,333
1.58	2.50	1 1/8	34,000	11,333	68,000	22,667	88,000	29,333	88,000	29,333
1.20	2.25	1 1/8	26,000	8,667	52,000	17,333	68,000	22,667	68,000	22,667
0.89	2.00	1 1/8	19,400	6,467	38,800	12,933	50,000	16,667	50,000	16,667
0.62	1.75	1 1/8	13,600	4,533	27,200	9,067	36,000	12,000	36,000	12,000
0.50	1.50	1 1/8	11,000	3,667	22,000	7,333	29,000	9,667	29,000	9,667
0.39	1.25	1 1/8	8,800	2,933	17,600	5,867	22,800	7,600	22,800	7,600
0.30	1.00	1 1/8	6,800	2,267	13,600	4,533	17,700	5,900	17,700	5,900
0.22	.75	1 1/8	5,000	1,667	10,000	3,333	13,100	4,367	13,100	4,367
0.15	.50	1 1/8	3,400	1,133	6,800	2,267	9,600	3,200	9,600	3,200
0.10	.25	1 1/8	2,400	800	4,800	1,600	6,600	2,200	6,600	2,200
Tensile Strength of Wire per Sq. In.			75,000 to 90,000 Pounds.		150,000 to 200,000 Pounds.		190,000 to 225,000 Pounds.		225,000 to 275,000 Pounds.	

TABLE II.—BENDING STRESSES OF 19-WIRE ROPE.

Diameter of Bend.	6	8	10	12	14	16	18	20	22	24	26
Diameter of Rope.											
1½	1,801	1,390	1,131	965	827	728	654	586	535	495	455
1¼	3,308	2,568	2,098	1,774	1,536	1,355	1,212	1,096	1,000	920	852
1¼		3,776	3,094	2,620	2,273	2,006	1,796	1,626	1,485	1,366	1,265
1¼			5,351	4,546	3,951	3,494	3,132	2,838	2,594	2,389	2,214
1¼				6,609	5,755	5,096	4,573	4,147	3,793	3,495	3,241
1¼					8,337	7,393	6,642	6,029	5,519	5,089	4,721
1¼					11,565	10,270	9,237	8,392	7,689	7,095	6,586
1¼						13,360	12,027	10,936	10,027	9,257	8,597
1¼							15,309	13,932	12,782	11,807	10,971
1¼								21,403	19,662	18,183	16,910
1¼										27,612	25,707
1¼											35,620
Diameter of Bend.	28	30	36	48	60	72	84	96	108	120	
Diameter of Rope.											
1½	423	398	338	250	200	167	144	126	112	101	
1¼	795	742	621	468	376	314	270	236	210	189	
1¼	1,178	1,102	924	698	561	469	403	353	314	283	
1¼	2,063	1,931	1,620	1,226	986	824	708	621	553	498	
1¼	3,021	2,829	2,376	1,800	1,448	1,212	1,042	913	813	733	
1¼	4,403	4,125	3,468	2,630	2,118	1,773	1,525	1,338	1,191	1,074	
1¼	6,145	5,759	4,847	3,680	2,967	2,485	2,137	1,876	1,671	1,506	
1¼	8,024	7,524	6,201	4,818	3,886	3,257	2,802	2,459	2,191	1,976	
1¼	10,245	9,609	8,101	6,165	4,977	4,173	3,591	3,153	2,809	2,534	
1¼	15,805	14,835	12,528	9,556	7,724	6,481	5,583	4,886	4,371	3,943	
1¼	24,047	22,589	19,113	14,614	11,830	9,937	8,566	7,528	6,714	6,059	
1¼	33,347	31,347	26,566	20,357	16,500	13,872	11,966	10,523	9,387	8,474	
1¼		42,036	35,683	27,400	22,239	18,713	16,153	14,209	12,682	11,452	
1¼			48,109	37,028	30,096	25,350	21,897	19,272	17,209	15,545	
1¼			61,238	47,229	38,436	32,403	28,008	24,662	22,030	19,906	
1¼				59,094	48,152	40,629	35,140	30,957	27,664	25,005	
1¼				74,565	60,844	49,919	44,476	39,203	35,048	31,689	
1¼				90,325	73,795	62,379	54,022	47,639	42,606	38,534	
1¼					88,409	74,795	64,814	57,183	51,160	46,285	
1¼					125,387	106,265	92,203	81,428	72,908	66,002	
1¼						145,246	126,185	111,546	99,951	90,540	

19-wire cast steel rope, the bending stresses are two-thirds and the remaining useful strength is one-third of the "maximum safe load" that the rope will carry. The "maximum safe load" is taken as one-third the ultimate strength, which is about the elastic limit of the wire; or the available strength is only one-ninth of the ultimate. In order to cut down the bending stresses so as to leave one-fifth of the ultimate strength of the rope available for useful work, the sheaves must be about eighty times the diameter of the rope. Other grades of rope require different diameter of drums, as will be seen by studying Tables I and II:

Table II is based on the formula $k = \frac{Ea}{2.06 \frac{R}{d} + C}$

in which k represents the bending stress in pounds, E the modulus of elasticity = 28,500,000, a the aggregate area of the wires in square inches, R the radius of the bend in inches, d the diameter of the individual wires in inches, and C a constant depending on the number of wires in the strand. The values of d and C are, for 19-wire hoisting rope: $d = \frac{1}{16}$ diameter of rope and $C = 45.9$ *

As an example, required the working load of a 1-

inch cast steel rope running over a 6-inch sheave. From Table II the bending stress is found to be 9937 pounds, and from Table I the "maximum safe stress" is found to be 22,667 pounds, and the difference is 12,730 pounds as the working load.

The size of the rope fixes the minimum diameter of the drum, but the questions of speed and length of drum also influence the final choice of the diameter.

The maximum length of a drum, aside from the question of room, is controlled by the allowable fleet angle—that is, the acute angle included between two lines drawn from the ends of the drum to the head sheave. This angle should not exceed 6°, in order that the rope may lead well onto the head sheave, and so that one rope will not grind or mount the next one in winding onto the drum. It is usual to place the drum far enough back from the head sheave to keep the fleet angle within the limit; but where it cannot be done it is necessary to guide the rope onto the head sheave and onto the drum by rollers or sheaves running on vertical spindles. The bisectrix of the fleet angle should strike the middle of the drum.

TYPES OF HOISTING ENGINES.—Single-cylinder engines are used in mining to replace man or animal power for light work. They are always geared and provided with a flywheel on the crankshaft. They must be started to a fair speed, in order that the flywheel may develop sufficient momentum to carry the crank over the center before the friction is thrown in to pick up the load. The cylinder should have 75%

* Tables I and II were calculated by William Hewitt and are published here by his permission. The originals, with other data on wire ropes, appeared in a pamphlet entitled "Wire Rope and Its Application to Power Transmission," 1901, issued by the Trenton Iron Co., Trenton, N. J., from whom copies can be obtained.

more power than is necessary to simply raise the load, in order that speed may be maintained.

Double-cylinder engines are used for all the regular work of mining. They may be divided into the following classes:

First—Geared: Single cylindrical drum; double cylindrical drum; double conical drum.

Second—Direct Acting: Single cylindrical drum; double cylindrical drum; double conical drum; Koepe system; reels for flat rope.

Each of these has a field of its own to which it is best adapted. Thus the geared engine is used mostly for shallow depths and small outputs per day, while the direct acting engine is used where the output is large. There are many cases near the dividing line in which either type of engine will give equally good results, and it is largely a matter of personal choice as to which is used.

Geared engines are made with small cylinders and the engine proper runs at a speed of 100 to 200 revolutions per minute. The gearing usually gives a reduction of one-third to one-fifth, so that the drum revolves at a moderate speed. The small cylinders make the first cost lower than that of a direct acting engine, but the gearing for large hoists is a serious objection. The main gear has about the same diameter as the drum, so as to keep the pressure on the teeth as low as possible, and hence it has a circumferential speed equal to the speed of hoisting. Gearing, under favorable conditions, should not run at a speed over 1200 feet per minute, and with the large cast gears and the rough work to which hoist-

readily be run at an average speed of 1500 feet per minute, and the largest engines can run in deep shafts as much as 2500 feet per minute.

Single-drum engines are limited to small outputs per day, or to places where the first cost of the plant is so important as to outweigh the loss in increased operating expenses. This type of engine has many applications, as for sinking winzes and for other inside work; also for shaft sinking and for working coal mines on a small scale, where the cost of fuel is no item, as waste material is burned. They are largely used in the Joplin, Mo., district, where the hoisting is from vertical shafts 100 feet deep, the output often only 25 to 50 tons per day, and the ore raised in huckets without guides, thus keeping the dead weight small, as compared with the weight of ore raised. They are not adapted for regular mining work on a large scale, as the work expended in raising the cage, car and rope each trip would exceed the work of raising the ore.

Double-drum engines overcome the dead work of hoisting the ore carriers by balancing the weight of the cage and car in one compartment against those in the other. They are thus more economical to operate than a single-drum engine, and the cost of installing will probably not be over 50% greater than for a single-drum engine. As the cost of sinking a shaft large enough for two hoisting compartments and a manway is not much more than to sink one having only one hoisting compartment and a manway, the head buildings must be nearly the same in either case, and the double drum engine will have smaller

will be admitted for the full stroke and at its maximum throttle pressure.

Hoisting engines belong to the slow speed type of engines. Their valves are simple slide valves in all but the largest sizes, and then they are usually of the Corliss class. They seldom have governing devices, their speed being determined by the hoisting engineer by means of the throttle, the link motion and the brake.

With these classes of engines the piston speed may be taken at 200 to 400 feet per minute for engines of 12 to 24-inch stroke, and from 400 to 600 feet per minute for those with 24 to 72-inch stroke. Very high-grade engines, with other valve gearing, may run at higher piston speeds.

At the instant of starting, the power in one cylinder acting on the crank, in the top or bottom position, must have a moment equal to or greater than the moment of the unbalanced load pulling from the circumference of the drum. After starting, the other cylinder comes in to accelerate the speed and the two together are able to hoist the load with steam partially cut off and still maintain the full speed. In all the following equations let

W = weight of unbalanced load in pounds.

C = weight of cage and car in pounds.

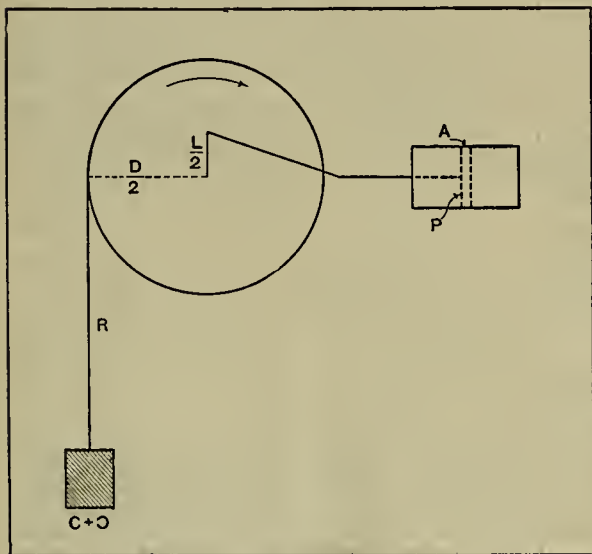
O = weight of ore in pounds.

D = diameter of drum in feet.

P = M E P = mean effective steam pressure in cylinder in pounds per square inch.

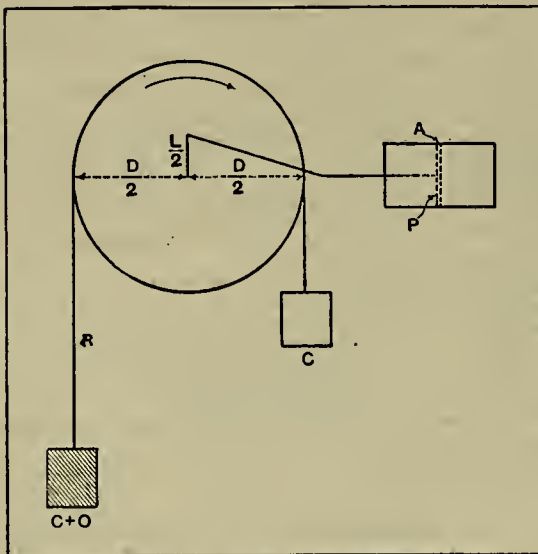
A = area of cylinder in square inches.

FIG. 1



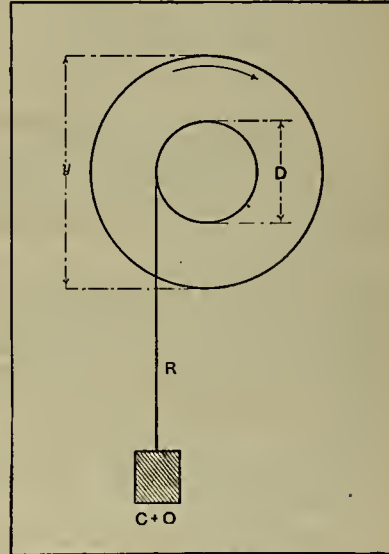
SINGLE CYLINDRICAL DRUM ENGINE

FIG. 2



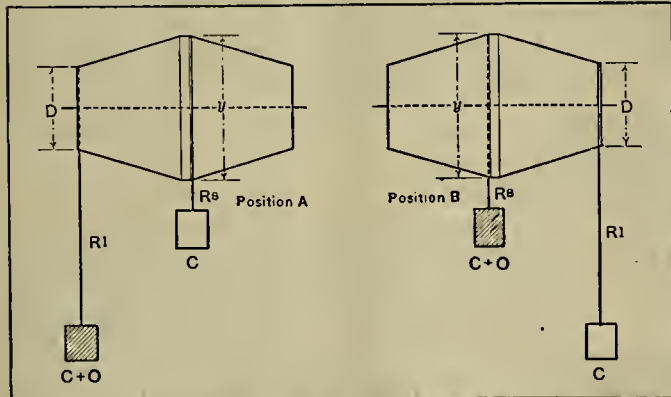
DOUBLE CYLINDRICAL DRUM ENGINE

FIG. 4



FLAT ROPE REEL

FIG. 3



DOUBLE CONICAL DRUM ENGINE

cylinders, which will partly offset the cost of the second drum.

With cylindrical drums, the ropes in the two compartments are of constantly varying lengths from the cages to the head sheaves, and are in balance only when the cages are passing at the center. With double conical drums, the work on the engine is kept constant by giving the cage at the bottom the short leverage of the small end of the drum, and the cage at the top the longer leverage of the large end of the drum.

The Koepe system, as applied to a double-compartment shaft, has a tail rope passing from the bottom of one cage down and around an idle sheave at the bottom of the shaft and up to the other cage. Thus the weight of the rope in the two compartments is exactly equal, and the whole hoisting mechanism is in balance at all points of the trip.

The flat rope system of hoisting attempts to equalize the work on the engine by coiling a rope of rectangular cross sections on a reel, like a surveyor's linen tape, so that the diameter of the reel increases and the leverage of the load increases as the weight of the constantly shortening rope decreases. Thus the work on the engine is kept constant, when the rate of increase of leverage and decrease of weight are in inverse proportion to each other. The flat ropes, however, are heavier than round ropes of the same strength, are shorter lived, and cost more at first and for subsequent care. The flat rope system is very largely used in Montana, and in some other districts which have followed the Montana practice.

The peculiarities of the different types of engines are brought out more fully by the calculation of the size of their cylinders when equipped with the different arrangements of drums.

CALCULATION OF THE CYLINDERS.—The maximum work on the engine is in picking up the load and in overcoming its inertia. At this time one crank may be on a dead center, so that all the work must be done by the other. At this part of the hoist steam

L = Length of stroke in feet.

S = speed of hoisting in feet per minute.

N = number of revolutions of engine per minute.

F = friction in pounds.

f = coefficient of friction.

r = ratio of diameter of piston to length of stroke, both being in feet or both in inches, = $\frac{\text{stroke}}{\text{diameter}}$.

d = diameter of piston in inches.

e = efficiency of engine.

g = ratio of gearing = $\frac{\text{diameter of gear}}{\text{diameter of pinion}}$.

Then, for a single-drum, direct-acting engine (Fig.

1) the moment of the load = $(W + F) \frac{D}{2}$ and the moment of the engine = $(P \times A \times e) \frac{L}{2}$, placing these equal to each other,

$$\frac{(W + F) D}{2} = \frac{P \times A \times L \times e}{2} \quad (4)$$

If the drum is geared the engine will make g revolutions to one of the drum, or the leverage of the engine is increased to g times what it would be if direct connected, and the equation becomes

$$\frac{(W \times F) D}{2} = \frac{P \times A \times L \times e \times g}{2} \quad (5)$$

This is the general equation for all hoisting engines. If they are direct connected, the ratio of the gearing g = 1.

When the weight of the load, size of the drum, and steam pressure are given to determine the size of the cylinders, there are two unknown quantities in the equation, viz., A and L. Here L can be assumed and the equation solved for A, from which the diameter can be obtained. The usual practice is to so proportion the cylinder that the length of travel is one and one-quarter to two and one-half times the diameter of the piston. If the value of L chosen for trial gives a ratio of stroke to diameter outside of these limits, another value must be taken for L and another solution made. If the ratio is decided upon first, then the area can be expressed in terms of the

ing engines are subjected the speed should probably not exceed 900 feet per minute. If the average speed of hoisting is kept at about two-thirds of this maximum the average speed will not exceed 600 feet per minute. This speed will allow the use of moderate-sized drums and keep the piston speeds within the limits of good practice.

That gearing is liable to cause trouble and make considerable noise when run at a high speed has been forcibly impressed on the mind of the writer by his experience in charge of a geared hoister, made by a reliable manufacturer, having cylinders each 18 inches diameter by 24-inch stroke, and two drums, each 7 feet 6 inches diameter by 5-foot face, on which three main gears, between 7 and 8 feet diameter, 3-inch pitch and 9-inch face, were broken inside of nine months. The gears cost about \$300 each, besides the labor of replacing and the loss of 24 hours to change the old for a new one. The engine was hoisting from a shaft 1000 feet deep in about 1½ minute. The load of ore was 2½ tons.

Direct acting engines should not be used for hoisting speeds of less than 500 feet per minute, as the piston speed will be too slow for economy. They can

stroke, and there is only one unknown in the equation. Thus $rd = 12L$ or $d = \frac{12L}{r}$ ($12L$ being the length of the stroke in inches), and

$$A = \pi \frac{d^2}{4} = \pi \frac{144L^2}{4r^2};$$

which, substituted in equation 5, gives

$$\frac{(W + F)D}{2} = P \times \pi \frac{144L^2}{4r^2} \times \frac{L}{2} \times e \times g. \quad (6)$$

Having obtained the size of the cylinders, and knowing the speed of hoisting and size of drum, the speed of the engine can be obtained and the speed of the piston can be investigated. The speed of hoisting in feet per minute divided by the circumference in feet will give the number of revolutions of the drum per minute. If the drum is geared the engine will make g times as many revolutions per minute as the drum, and

$$N = \frac{S}{\pi D} g. \quad (7)$$

The piston speed in feet per minute $= 2L \times N$, or

$$\text{Piston speed} = \frac{2LS}{\pi D} g. \quad (8)$$

Where the engine is direct acting $g = 1$ in both equations 7 and 8.

The horse power available for hoisting when the engine is running at full speed will be expressed by the formula:

$$\text{H. P. of engine} = \frac{P \times L \times A \times 2N}{33000} \times e, \quad (9)$$

and the horse power required to raise the load will be:

$$\text{H. P. of load} = \frac{(W + F)S}{33000}. \quad (10)$$

In the examples here given the weight of the car is taken as two-fifths and the weight of the cage as three-fifths of the weight of the ore hoisted. These together make the dead load C equal to the weight of the ore O . These are sufficiently close to the usual practice for an illustration of the method of using the formulas.

As an example, take a double-cylinder engine geared to a single drum under the following known conditions, to find the size of cylinders required: Vertical shaft is 400 feet deep, cage to be hoisted in 1 minute; the weights are, cage 900 pounds, car 600 pounds, ore 1500 pounds; steam pressure, P is 60 pounds, $e = 0.7$, $g = \frac{1}{4}$, $f = .01$ (assumed), $D = 4$ feet, and L may be taken as $\frac{1}{2}$ foot for a trial solution; then

$W = C + O + R = (600 + 900) + 1500 + (400 \times 1) = 3400$ pounds. $F = Wf = 34$ pounds. Substituting equation 5,

$$(W + F) \frac{D}{2} = P \times A \times \frac{L}{2} \times e \times g$$

$$(3400 + 34) \frac{4}{2} = 60 \times A \times \frac{1}{2} \times 0.7 \times \frac{1}{4}$$

$$A = 54.5.$$

$$d = 2\sqrt{\frac{A}{\pi}} = 8.33; \text{ say } 8\frac{1}{2} \text{ inches.}$$

The stroke L was taken as 18 inches for a trial solution and it gives a well-proportioned cylinder, viz., $8\frac{1}{2}$ inches diameter by 18-inch stroke.

The speed of the piston can be tested by equation 8.

$$\text{Piston speed} = \frac{2LS}{\pi D} g = \frac{2 \times 1\frac{1}{2} \times 400 \times 4}{3.1416 \times 4} = 382$$

feet per minute, which is within the limits of these engines.

From equations 9 and 10, combined, the mean effective pressure required in the cylinders to perform the work can be determined. Substituting the known values in these equations, and placing one equal to the other and solving,

$$\text{H. P.} = \frac{(W + F)S}{33000} = \frac{P \times L \times A \times 2N}{33000} \times e$$

$$\frac{3434 \times 400}{33000} = P \times \frac{1}{4} \times \frac{2 \times 56.75}{33000} \times 2 \times$$

$$\left(\frac{400 \times 4}{3.1416 \times 4} \right) \times 0.7 P = 45,$$

which, with 60 pounds at throttle, corresponds to a cut-off of about one-half. As both cylinders are in use, the area has been doubled in the above calculation.

With double-drum hoisters, where the descending cage and car counterbalance the ascending ones, the general equation 5 still applies, but the values of W and F are changed. Referring to Fig. 2, when a loaded car is to be started from the bottom of the shaft and an empty car is being lowered at the same time,

$$W = (R + C + O) - C = R + O, \text{ and}$$

$$F = (R + 2C + O) f,$$

which values must be used in the first member of equation 5.

As an example, take a hoister raising a load from a double-compartment shaft 2000 feet deep in 1 minute: $O = 5000$ pounds, $C = 5000$ pounds, $R =$

6000 pounds, $D = 8$ feet, $P = 60$ pounds, engine direct connected; hence $g = 1$, $f = 0.01$, $e = 0.7$. Taking $L = 4$ feet for a trial and substituting in equation 5 to find the size of cylinders,

$$(W + F) \frac{D}{2} = P \times A \times \frac{L}{2} \times e \times g$$

$$(11000 \times 210) \frac{8}{2} = 60 \times A \times \frac{4}{2} \times 0.7 \times 1$$

$$A = 534$$

$$d = 2\sqrt{\frac{A}{\pi}} = 26\frac{1}{2} \text{ inches.}$$

This gives a cylinder $26\frac{1}{2}$ inches diameter by 48-inch stroke. Determining the piston speed by equation,

$$\text{Piston speed} = \frac{2LS}{\pi D} g = \frac{2 \times 4 \times 2000 \times 1}{3.1416 \times 8} = 637 \text{ feet}$$

per minute. While the proportions of the cylinders follow the usual practice, the piston speed exceeds the limits previously set for this class of engines, viz., 400 to 600 feet per minute. This speed can be reduced by choosing a smaller valuation for L in equation 5, which will give a cylinder larger in diameter. Thus, if the length had been taken as 44 inches, or $L = 3\frac{1}{2}$ feet, d would have been $27\frac{1}{2}$ inches,

and the ratio $\frac{12L}{d} = 1.6 +$, and the piston speed $=$

584 feet per minute.

Or, instead of shortening the stroke, the number of revolutions can be cut down by increasing the diameter of the drum. Thus, if $D = 9$ feet, $L = 4$

feet, d will be $27\frac{1}{2}$ inches, and the ratio $\frac{12L}{d} = 1.73$ and the piston speed $= 566$ per minute.

Conical drums, as already noted, are intended to equalize the varying load on the engine, due to the change in length and weight of the rope as the cage ascends and descends. As these engines are used where every economy is desirable, they are usually direct-acting and fitted with double drums.

The minimum diameter of the drums is determined by the size of the rope.

Referring to Fig. 3, let D represent the small diameter of the drum in feet.

y = diameter of large end of drum in feet.

C = weight of cage and car in pounds.

O = weight of ore in pounds.

Rl = weight of the long length of rope when cage is at the bottom of the shaft.

Rs = weight of the short length of rope when cage is at the top of the shaft.

Then $(C + O + Rl) \frac{D}{2} - (C + Rs) \frac{y}{2} =$ moment of

the resistance when the load is at the bottom (Fig. 3, position A), and $(C + O + Rs) \frac{y}{2} - (C + Rl) \frac{D}{2} +$ moment of the resistance when the load is at the top (Fig. J, position B). The object of the conical drums being to keep this moment constant, these two values must be equal, and

$(C + O + Rl) - (C + Rs) y = (C + O + Rs) y - (C + Rl) D$ (11)

Solve for y . Then, taking either end of the case, say when the load is at the bottom, the moment of the resistance of the loads, with friction added, must equal the moment of the power of the engine, and, following the same form as equation 5, gives:

$$(C + O + Rl) (1 + f) \frac{D}{2} - (C + Rs) (1 - f) \frac{y}{2} = P \times A \times \frac{L}{2} \times e \times g. \quad (12)$$

Taking as an example the one used for the engine with double cylindrical drums, depth 2000 feet plus $33\frac{1}{2}$ feet to head sheave above landing, $S = 2000$ feet per minute, $O = 5000$ pounds, $C = 5000$ pounds, $Rl = 6100$ pounds, $Rs = 100$ pounds, $D = 7$ feet, $P = 60$ pounds, $g = 1$, $f = .01$, $e = 0.7$, L for trial $= 4$ feet to find diameter of cylinder. From equation 11

$$(C + O + Rl) D - (C + Rs) y = (C + O + Rs) y - (C + Rl) D$$

$$(16100 + 7) - (5100 y) = (10100 y) - (11100 \times 7) y = 12.52 \text{ feet} = \text{diameter of large end of drum.}$$

$$\text{Substituting in equation 12}$$

$$C + O + Rl = 5000 + 5000 + 6100 = 16100 \text{ pounds.}$$

$$1 + f = 1.01$$

$$C + Rs = 5000 + 100 = 5100 \text{ pounds.}$$

$$1 - f = 0.99$$

$$(16100 \times 1.01 \times \frac{7}{2}) - (5100 \times 0.99 \times \frac{12.52}{2}) =$$

$$60 \times A \times \frac{4}{2} \times 0.7 \times 1$$

$$56914 - 31607 = 84 A$$

$$A = 301$$

$$d = 2\sqrt{\frac{A}{\pi}} = 19\frac{1}{2} \text{ inches.}$$

From equation 8

$$\text{Piston speed} = \frac{2LS}{\pi D} = \frac{2 \times 4 \times 2000}{\pi (7 + 12.52)} = 522 \text{ feet}$$

per minute, D being here taken as the mean diameter.

There must be a division left between the ropes on a conical drum in order to furnish positive grooves for the rope, so that the large coils cannot slip down over the smaller ones. Hence the drum must be longer than those of the cylindrical design, even when the mean diameter of the conical drum is the same as the diameter of the cylindrical one.

In the Koepe system, as applied to a double-compartment shaft, there is a tail-rope of the same weight as the hoisting rope fastened to the bottom of one of the cages, passed around a sheave in a pit at the bottom of the shaft, and attached to the bottom of the other cage. Then, in whatever position the cages are, in the shaft, there is the same weight of rope hanging in each compartment. Thus the entire weight of the hoisting mechanism is in perfect balance at all times, and the engine only has to raise the weight of the ore and overcome the friction of the moving parts. The main rope may be wound on a pair of cylindrical drums, or it can be wrapped back and forth over a pair of multiple-grooved sheaves, as is done in rope drives for many purposes. It is essential that a positive grip is taken on the rope by the driving mechanism, or else its creeping on the driving sheaves will make the indicators show a false position for the cages and make accidents of overwinding a great source of danger.

The calculation of the size of the engines required can be made by equation 5. The engines would usually be direct-acting.

As an example, assume the same conditions as have been used before:

$S = 2000$ feet per minute. $O = 5000$ pounds. $C = 5000$ pounds. $R = 6000$ pounds. $P = 60$ pounds, $e = 0.7$, $f = 0.01$, $g = 1$, $D = 8$ feet, $L = 4$ feet, for trial.

$$(W + F) \frac{D}{2} = P \times A \times \frac{L}{2} \times e \times g. \quad (5)$$

$$W = O = 5000 \text{ pounds. } F = f(O + 2C + 2R) = 0.01 \times 27000 = 270.$$

$$(5000 + 270) \frac{8}{2} = 60 \times A \times \frac{4}{2} \times 0.7 \times 1$$

$$A = 251.$$

$$d = 2\sqrt{\frac{A}{\pi}} = 18 \text{ inches.}$$

This is rather a small diameter for a cylinder of this length, as its length is two and two-thirds times the diameter, which exceeds the ratio already recommended. If L were taken as 36 inches, the area would be 335 square inches, corresponding to $20\frac{1}{2}$ inches diameter, which gives a cylinder with better proportions.

The piston speed can be obtained from equation 8, and the mean effective pressure required, when hoisting at full speed, can be found from equations 9 and 10 combined.

It is interesting to compare the size of the three types of engines, hoisting the same load at the same speed. These tabulated are:

Type.	Dia. of Drum.	$(W + F) \frac{D}{2}$	Dia. of Cylinder.
Cylindrical Drums.....	9.76	59198	29
Conical Drums.....	9.76	24669	19 $\frac{1}{2}$
Koepe System.....	9.76	25727	19 $\frac{1}{2}$

The conditions in all of the above were the same as used in former examples, except that the diameters of drums are all taken as 9.76 feet, which is the mean diameter of the conical drums. The engines are direct-acting, the shaft has double compartments and the cages work in balance. $C = 5000$ pounds, $O = 5000$ pounds, $R = 6100$ pounds, $P = 60$ pounds, $L = 4$ feet, $f = .01$, $e = 0.7$, $g = 1$, $S = 2000$ feet. The piston speed is 522 feet per minute in each case.

The table shows that cylindrical drums are not as economical to operate as either the conical drums or the Koepe system. The conical drums are expensive to make, as the grooves have to be formed spirally and with an increasing radius, and each problem requires a specially designed drum, so there can be little use made of stock patterns. They are only used where the rope is heavy, and the economy of accurate counter-balancing is clearly indicated, and will offset the extra cost of manufacture.

The Koepe system is a simple method of counter-balancing, and the principle could often be applied to existing plants with cylindrical drums by adding a tail-rope and an idle sheave at the bottom of the shaft, provided there is sufficient sump room for the sheave and its slide. The objection to the Koepe system, where used without drums, is the liability of the ropes to creep on the sheaves, causing the indicators to give a false record and so increase the danger of overwinding.

Flat ropes of rectangular cross-section are wound on a reel like a tape. When the load starts from the bottom of the shaft the rope winds on the center of the reel, which is of small diameter, and then, as the load rises, the successive layers increase the diameter of the coil on the reel. Thus the leverage of the

load increases and the weight decreases. If the original diameter of the barrel of the reel and the thickness of the rope are properly chosen, the moment of the resistance will be constant.

The proportions of the reel can be found as follows:
Let D = diameter of the barrel in feet.

y = diameter of coil of rope, when cage is at the top, in feet.

C = weight of cage and car, O = weight of ore, and R = weight of rope, all in pounds, as before.

l = length of rope or depth of shaft in feet.

t = thickness of rope in inches.

n = number of layers of rope in coil.

Then, referring to Fig. 4,

$$\frac{y+D}{2}n \times n = l \text{ and } \frac{(y-D)12}{2t} = n.$$

Substituting the latter value of n in the first equation gives

$$\frac{y+D}{2}n \times \frac{(y-D)12}{2t} = l.$$

$$(y^2 - D^2) \frac{3n}{t} = l. \quad (13)$$

From equation 13, knowing t , the value of y can be obtained, or, having decided on y , the equation can be solved for t . The minimum diameter of the barrel D depends on the thickness of the rope, and can be calculated from Mr. Hewitt's equation, previously given:

$$k = \frac{Ea}{2.06 \frac{R}{d} + C}, \text{ in which } k = \text{head-}$$

ing stress in pounds, E = modulus of elasticity = 28,500,000, a = aggregate area of the wire in square inches, R = radius of the head in inches, d = diameter of individual wires, and C a constant depending on the number of wires in a strand. With flat rope, $d = \frac{1}{2}$ the thickness of the rope and $C = 27.54$.

The moment of the resistance at starting the load would be the moment of the weight, $C + O + R$, plus the friction, acting with the lever arm $\frac{D}{2}$, as by equation 5.

The ideal case would be one in which the work of hoisting was constant at every part of the hoist; but the thickness of the rope may be such that the leverage of the load increases faster or slower than the weight of the load decreases, thus making the work on the engine vary during the trip. In such a case the design must be tested with the cage at various points, to make sure that the engine has sufficient power to handle the loads at the desired speed at all points. For these equations 9 and 10 may be used.

Generally these hoists are arranged in pairs, so that one cage ascends while the other descends. Then the necessarily large diameter of the reel, to make the work more constant on the engine, can be found by equation 11, used for conical drums, and the size of the engine from equation 12, after which the thickness of the rope can be found by equation 13.

If the reels cannot be made of such diameter, with a reasonable thickness of rope, as to make the work of hoisting uniform throughout the trip, then the case must be considered by itself, and the design must be tested with the cage in positions sufficiently numerous to prove that the engine that will start the load is strong enough to handle it at all points.

An Ingenious Theory.

Most pure metals are in an unstable condition. They have been freed from combination with other chemical elements by the expenditure of energy and these elements are always waiting their chance to enter anew into the combination. Will all the earth's available metals be finally used up? The history of the use of metals is that of the progress of civilization, so that their total disappearance would be a calamity. In a recent "Introduction to the Study of Metals" by a French author this subject is taken up, and the author concludes that the oxidized metals are finally transformed again into ores and will ultimately collect under ground for future miners to dig up again. We quote from a review in *Echo des Mines*:

"A metal, when extracted from its ore, is always subjected to the action of a large number of alternative forces under whose influence its weight diminishes little by little, until it ends by disappearing. Its life may be short or it may be extremely long, but it returns at last to the earth whence it came. It is to be noted that in most cases it even reassumes the form in which it was first found as an ore. Iron or tin, which we extract generally from their oxides, are destroyed by oxidation; the principal sources of copper are oxides and sulphides, and this metal disappears chiefly by oxidation or sulphuration; silver, which we find in the form of simple or complex sulphides, is changed back into sulphide with great ease; and lead, whose principal alteration products are the sulphide and the carbonate, is found chiefly in the form of galena and ceruse. Gold and platinum, which are rarely found other than pure, and which are only slightly alterable under the most di-

verse influences, are used up and disappear by friction and mechanical action.

"Thus, the masses of metal prepared industrially are altered and disappear little by little, and their remains are scattered as dust that mingles with the other elements of the soil. Then they meet with saline substances and with water, which dissolve and mineralize them, causing them to enter into the cycle of operations that is going on in the interior of the globe. These waters circulate in the cavities of the earth's crust, and apparently they take part in the reconstruction of minerals, which, in the course of centuries, will form new metalliferous deposits to be exploited by the industries of a distant future."

The History of a Catalogue.

NUMBER IV.—CONCLUDED.

Written for the MINING AND SCIENTIFIC PRESS by CHAS. H. FITCH.

The Shakespearian phrase, "All this strange, eventful history," applies to our treatment of the subject in its strangeness, if not in its eventfulness. One of the most curious things about a catalogue is its size. This bears out my contention that the mainspring of the catalogue is personal advertisement. We may preach till the crack of doom about the convenience of standards and uniformity, but it is as difficult to get a catalogue publisher to use uniform size as it would be to get a free American to wear livery. Every man wants his catalogue to be something different and unusual, and an odd size appeals to the imagination as the cheapest kind of peculiarity that can be indulged. Few men keep well regulated catalogue piles, and these find life too short to permit of their huying many goods. A catalogue filed neatly on the shelf with other catalogues of the same size is entirely too unobtrusive. It does not get in our way and attract our attention enough. Odd sizes are a bother, but people who bother us get our business. A catalogue too irregular to keep and too good to throw away is a living issue until its fate is decided, but a catalogue filed is very likely relegated to oblivion.

Catalogues giving illustrated lists of supplies are to be excepted from the criticisms made against the ordinary run of argumentative catalogues. But these elaborate useful reference lists have a limited purpose. They are designed chiefly to serve the ends of the jobber and middleman, and not to help the user in his selections. To connect properly with the user they often require a great deal of explanation. And they are the greatest sinners against standard size, ranging from vest-pocket souvenirs to "unahridged dictionaries."

When some manufacturing concerns get an infusion of new thought, or turn over a new leaf, resolving that they will thenceforth do things in a way more satisfactory to their patrons and their profits, the first fruits of these good intentions are often expressed in a new size of catalogue—something that will mark a new era. These efforts are ephemeral, but the odd sizes remain.

The hardware manufacturers of Connecticut set a fashion of encyclopedia sizes. Their goods were small—door locks and knobs—but the way they were shown up was a feast for the engravers. An effort to reduce bulk was made by the Yale & Towne Co., who employed Henry H. Supplee, a gifted technical writer, who translated Reauleaux's great work, "Der Constructeur," and the Lubben system of mathematics. The result was one of the most elegant little volumes ever published on any subject, something for the bibliophile to cherish. Everything is closely detailed, dimensioned and coded, and a companion volume gives a key to the other, including prices. For its purpose, it is hard to see where it could be improved. It is standard size, 6"x9", but secures special attention by the merit of its make-up.

One objection to the standard 6"x9" is that it cramps illustration, and we must either illustrate poorly, or put in folders, or illustrations cut in twain by the backbone of the book.

About twelve years ago the Westinghouse people spread themselves in a new catalogue which was large enough to go by freight. It was wider than a door and had covers of heavy board glazed with mineral, so as to represent blacksmith work—a kind of iron gate.

It contained a treatise on sectional machinery, probably obsolete by this time. I question if anyone ever read that treatise out of that book, for the reader would have been like Moses—needing a man on either side to hold up his hands—as was done by Aaron and Hur. This book emphasized the existence of a great company. A lot of them were received by the concern I was with; but if the money spent in their making had been put into commissions it would have done more to help sales. For a few weeks the pile of them occupied a desk space in a crowded office. But we had samples enough of iron, wood and similitudes thereof already lying about the place, so the catalogues were removed to the cellar. We could not afford to send them out. At last I saw several of them stood up to form a bin for charcoal. Surely, that thing is best which is not highest nor costliest,

but which is most exactly fitted to its reasonable and modest purpose. Contrast with the monstrosity mentioned the elegance of Mr. Supplee's catalogue, in which, by the way, his name does not appear. The taste and finish of the latter was an expense, but it was all in the line of useful requirements, thought and care in every line.

I am opposed to irrelevant matter in catalogues. Dirt is described as matter out of place, and, to be in place, we should have our catalogues defined by their titles, to indicate what we can surely find in them. It is a mistake to suppose that mining men have time to hunt out the treasures of useful information hidden in some catalogues. Indexes are a subject worthy of expert care. A "horse index" is a name given to one, laughable from a technical standpoint. I had turned over to me a catalogue on which well-known engineers had spent time of preparation with several thousand dollars. Its arrangement could not have been worse if it had "happened in the night," as James Maxwell used to say of a disorderly design. Among its treasures was the most equine kind of a "horse index." For example, things were indexed under particles "A" and "the," and under "I" was a string of "Illustrations of this" and "Illustrations of that." It strikes me that a person who would make such an index as that would not know which end of a knife or fork was the handle.

To make a good index a man must have a logical mind and a close acquaintance with his subject. To set the ideas in order in running text does not require more wit than to make the captions and arrange them in a table of contents. There are problems in indexing as yet unsolved. Try to index a catalogue of hoisting engines. The number of functions and varieties is large, but language and common understanding have not been made to meet in a concise method of describing them. I had a discussion on this very point with an engineer of the Rand, and challenged him to index a list of various types of hoisting engines. He thought it would be easy, but, when put to test, promptly begged off.

No catalogue of hoisting engines that I know has a good index. Some have pictorial indexes giving a few pages of small cuts, so that the reader can see and refer to what is beyond the scope of our language to briefly and fitly describe. With all our expansion of dictionary and scientific terminology the catalogue requirements are not satisfied.

I had an amusing inquiry from an encyclopedia writer—a classical graduate, whose acquaintance with doctrinal theology was supposed to be adequate equipment for handling any every-day technical subject. He asked information about "the" process for getting gold; the way the inquiry was put showing that he thought it all a simple little thing. Every reader of the MINING AND SCIENTIFIC PRESS—to which I referred the gentleman—knows how this process question expands to fill a universe with its details and philosophy. The catalogue is a similar expansive subject. I could easily find material for a large weekly publication for an indefinite period of issues on this one subject. Like the brook going on forever, the history of the catalogue will continue to be made after we are gone. It will move on and on as the exponent of present needs, and needs which leading aggressive minds are ever trying to impose upon their fellows.

What the catalogue ought to be the catalogue will tend to become. Improvements will be made looking to less narrowness and partiality, less deception, more general usefulness.

The era of combination will yet influence cataloguing in a very interesting way. Trade-paper advertisements are the prophecies as well as the advance agents of catalogues. There are many luxuries we can not afford, but which in the advance of the arts we become able to use, and find them economical. One of these luxuries is advertising space in the trade journals. I am in favor of putting catalogues into that space to a very large extent. Now, valuable as this space is, it is most wastefully used after it is bought. The thought and care necessary to make catalogues exactly to the point, and then put them into the columns of good trade journals, is my idea of the era of combination which is approaching in the history of catalogues.

This is one of many profitable things which it will pay to do, but which in our clumsiness and preoccupation we have not yet seen the way clear to do. Time was when a pioneer went overland in a "prairie schooner" labeled "Pike's Peak or Bust," but now he goes passenger and freight by the trains of the common railroad. A good trade journal is such a system of regular trains. It is cheaper to pay fare and freight on them than it would be to make your own wagon and travel by a team of your own. But the method of individual circularizing, while available to a limited extent, is as a whole as inferior to the use of a reliable trade journal as a prairie schooner is inferior to the Overland Express.

This is the most important conviction I have to offer on the subject of catalogues, and it is not theorizing. It comes of keeping tab on results. But the ability to travel to advantage will not alone make us good business men. We have yet to use the opportunities offered by the trade journal with more care, thought and conscience. Then they will pay for the cost of travel by them.

Mineral Wealth of China.

NUMBER II—CONCLUDED.

Written for the MINING AND SCIENTIFIC PRESS by
F. R. WARDLE.

Passing to the next tier of provinces south of Shantung, we enter the so-called "sphere of British influence," claimed to extend westward from the coast for 1000 miles inland, along the course of China's mighty river, the Yang-tse-Kiang. The Yangtze valley extends westward from Shanghai through the rich mineral provinces of Honan, Hunan and Hupeh, for some 800 miles to the famous gorges at Ichang, which is the imposing gateway to the province of Szechuen, 100 miles beyond. This immense territory is the richest and most productive portion of the Chinese Empire; therefore, the English have tried to grab it, according to their custom. It is not quite clear sailing with them, however, as the Germans dispute England's claim to exclusive control in the Yang-tse valley, and by every means in their power are extending and entrenching German influence and commerce. When England established her Indian troops at Shanghai, "to maintain peace and protect life and property," (the usual plea), at once Germany sent her troops to the same point, and since that time neither has consented to withdraw. All these intrigues, leading up to the final dismemberment of China, must make the very gods on high Olympus hold their sides in Jovian laughter at such a philanthropic masquerade. The snarling dogs, who quarrel over their bone heap, are really very much more honest, and, therefore, a more to be respected lot.

In the province of Hunan there is a large lake, called Tungting, around whose shores are valuable anthracite coal measures, equal in quality to the best Pennsylvania products. These coal fields are worked economically by natives, and the output has the advantage of cheap water transportation to all the markets of the Orient. I hurried this coal for two winters in my Shanghai office and found it entirely satisfactory. Its price is \$14 (Mexican) per ton, equivalent to \$7 in gold.

Immense bodies of bituminous coal underlie the heavy limestone and sandstone cappings of eastern Szechuen, and wherever these have been deeply cut by the erosion of mountain streams the coal is exposed. In the voyage through the famous Ichang gorges, 800 miles above Shanghai, one frequently sees these coal veins showing in the high banks; while at Kwei-fu, 32 miles beyond Chungking, there are coal mines in successful operation by natives. This coal is mined for less than 50 cents a ton, its laid-down cost at Chungking being \$1 and its selling price \$1.50 per ton, delivered. It is a soft, bituminous coal, of excellent quality, largely used in the small metallurgical operations conducted by the natives throughout this region.

Szechuen is a splendid province—the Switzerland of China—abounding in grand scenery, rugged mountains, extensive flora and untold mineral wealth. Its people are happy, prosperous and contented. Its area is about that of France and its climate is quite as delightful. A large part of the copper used throughout the Empire comes from this region, as well as the iron, made into queer little bricks, and on the swift current of the Yang-tse thousands of odd looking craft with brick chimneys cheaply transport these products to the markets below. At low water in winter the Chinese work on the river bars, washing gold from the detritus coming down from the Tibetan mountains. When that strange, unknown country of Tibet is open to Europeans and those mountains are prospected by experienced miners the matrices of the gold will show some astonishing developments. At present Tibet is a sealed world, of which only faint rumors drift to the outside. Many have tried to penetrate to its great Llamasary at Lassa, near the northeastern slope of the Himalayas, but, with few exceptions, have either perished or been turned back.

Szechuen is the nearest approach yet open to foreigners, and that is still 2000 miles distant from Lassa. In Szechuen seven important concessions for mining have been granted to English and French syndicates, but the disturbed condition of the country has rendered work impossible. The Pritchard Morgan party visited Szechuen just before the troubles broke out and secured what is believed to be a valuable concession.

In the southeastern portion of the province of Hunan the coal fields cover an area of 21,700 square miles and contain both anthracite and bituminous coals, of which the production is already considerable. Iron and copper are abundant in these provinces, often in favorable relation to the coal. Near the city of Meng-tse lead, tin and silver are found in considerable quantities.

Within the limits set for this article it is not possible to treat the resources of south China, which is under French control. In connection with mining in China, the three chief drawbacks should not be overlooked. Unless great care is exercised through experienced advisers long resident in China, speaking the language and familiar with the sinuosities of Chinese concessions, the confiding "franquai, or foreign

devil," is likely to acquire rather costly experience. Instances of this sort are not unknown in the Flowery Kingdom, and so shrewd and experienced a mining operator as Samuel Newhouse of Salt Lake City, Utah, told me about three years ago of an expedition he was then dispatching to north China to report on an extensive mining concession in the country northwest of Pekin, near Mongolia. Some time later, when I visited Tientsin and Pekin, I inquired what had been the outcome of this enterprise and was told that the men had been recalled and the project abandoned, because of defects in the concession from the Viceroy and other disqualifying causes. Under Chinese law, all mining concessions obtained from local officials must be confirmed by the advisers of the Emperor at Pekin.

There also exists a strange superstition among the Chinese that deep mining disturbs the "fengshui," or spirits of the air and water. "Fengshui" influences everything in China—the building of houses, the burial of the dead, and all the multifarious activities of daily life—and it does this in so many changing and elusive ways that the Western mind can not follow all the turnings. "Fengshui" has, without doubt, been the most powerful deterrent force that has checked the exploitation of China's great resources.

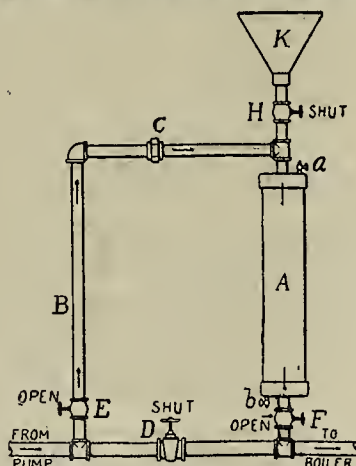
Another great drawback is the corruption and insatiable greed of the official or Mandarin class, without whose constant and heavy bribery nothing can be accomplished by foreigners. The case is known to me of a valuable gold-bearing quartz ledge, containing profitable values in sulphurets, which was bought by an American company and equipped at large expense with a most complete and modern plant. It was good property and with a confirmed title, clear and strong. The Viceroy of the province and the Taotai of the district were "canny," as the Scotch say. While money was being poured into plant and equipment, these officials, like Brer Rahhit in Uncle Remus' story, "laid low and said nuffin," hut, as soon as the mine started up for steady work, these Chinese began such a comprehensive system of extortion and harassment that the whole profits of the mine were absorbed, and the owners sold out the property and left the country in disgust.

When the wise Solomon named "three things that were never satisfied," he should certainly have included the Chinese Mandarin—always crying: "Give! give! give!" A witty army officer's wife, living at a lonely post, where the enlisted men were continually getting drunk and hawling, exclaimed in despair: "How lovely the army would be if only there were no soldiers!" In like manner, it may be said that China would be all right if there were no Chinese. To Europeans who dislike dirt, moral and material, the interior of China, far from treaty ports, is a hard proposition. As they say out there, "It is not good enough."

After its long sleep of 5000 years, great changes are now impending in China. The partition of its seaboard provinces must inevitably come within no distant period, and the long-locked doors of this rich treasure house will swing open to the world; then the Middle Kingdom will take front rank among producing nations.

Introducing Solvents into Boilers.

The illustration shows a simple device, which any engineer can easily construct, for pumping solvents into the boiler without passing through the pump. Referring to the illustration, A is a section of big



Arrangement of Pipes for introducing Solvents.

pipe—say 6 inches in diameter and 30 inches long—which is to serve as a reservoir. This connects with the feed pipe running from the pump to the boiler, by means of the pipes B, C and F, which are so arranged that they connect with the feed pipe on opposite sides of the stop valve D. Over the reservoir is a funnel, K, by means of which the reservoir, A, can be filled through the valve H. The reservoir, A, is provided with pet cocks, a and b, at the top and bottom, so that it may be readily filled and emptied. A union is provided at C, to facilitate the assembling of the

pipings. (A right and left elbow, of course, may be used instead, if it is preferred.)

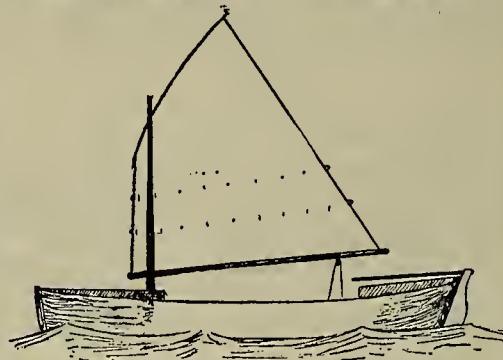
The device is used as follows: The reservoir A being empty, valves E and F, and pet cock b, are first closed, and valve H and pet cock a are opened. The soda ash solution is then poured into K, until the reservoir A is filled. The valve H and the pet cock a are then closed, as well as the valve D, in the main pipe. Valves E and F are then opened, and the pump is started. The device is then in the condition shown in the engraving, and the water from the pump passes through B, C and A, as shown by the arrows, sweeping the contents of A out into the boiler.

When the pump has been run long enough to thoroughly remove all soda ash from A, valve D may be opened, and valves E and F closed. The reservoir A is then emptied by opening pet cock h and either pet cock a or valve H, and the device is again ready for operation.

Boats for Prospectors.

A great deal of prospecting for woods and metals is being done this year along the bays and inlets of the shores of British Columbia. Herbert Carmichael, government assayer, says of the prospectors' boats:

These craft were built of a considerable size con-



Prospector's Boat.

sidering that they were invariably cut or dug out from a single cedar tree, being often 40 feet long by 1 foot beam, but it must be remembered that a canoe with 7 feet beam could be made out of a cedar having a diameter of only 6 feet.

This was accomplished, after hollowing out the canoe by fire and chipping, by filling it with water and heating the water by throwing in hot stones; then, while the wood was soft and pliable, forcing out the sides with sticks acting as stretchers.

A danger is always present with cedar canoes. They may split in a sea from end to end. This is more liable to occur when the canoe is old and the bottom has worn thin.

It is doubtful if sails were used by the Indians before the advent of the white man. Those used now are a sprit sail of rectangular form with a long gaff. This is kept from falling off the wind by a line from the peak—in fact, it is the end of the main sheet carried to the peak and forming a loop.

It appears to be only a matter of a few years till the canoe, as now used, will disappear and the Columbia river boat will take its place. The Indians are getting quite expert at the building of these boats, which are usually from 20 to 26 feet long.

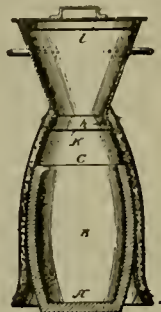
Platinum in Wyoming Copper

Mining and Metallurgical Patents.

Patents Issued October 21, 1902.

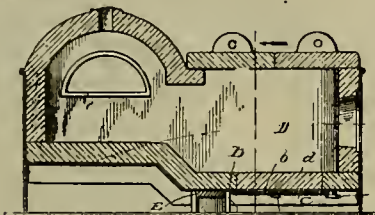
Specially Reported and Illustrated for the MINING AND SCIENTIFIC PRESS.

METHOD OF RECHARGING SMELTERS' CRUCIBLES.—No. 711,468; G. B. Brown, Reading, Pa.



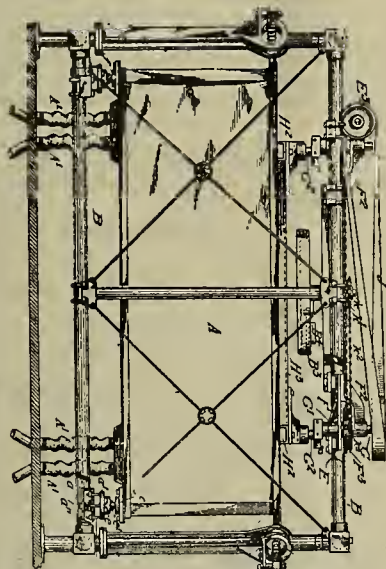
Method of recharging smelters' crucibles, consisting essentially in applying protecting shield to hot crucible immediately after its molten contents have been poured out, then recharging shielded crucible preparatory to removal of shield and introduction of newly charged crucible into smelting furnace.

ASSAYER'S FURNACE.—No. 711,554; A. C. Calkins, Los Angeles, Cal., assignor to F. W. Braun & Co., Los Angeles, Cal.



An assayer's furnace comprising sheet-metal floor B with openings h therethrough; sheet-metal walls or jacket extending below floor; door hinged to under side of floor to close opening b; fire-brick inside sheet-metal jacket formed by walls and floor; removable fire-clay mixture which rests upon trap-door; means by which trap-door is held up in place; strengthening bar equal in length to width between downward extensions of side walls of furnace below floor thereof, provided at each end with downwardly extending leg e provided with holes e' therethrough; bar also provided at mid-length with downwardly projecting boss or leg e'', bottom of which is in same plane with bottoms of side legs; depth from top of bar to bottom of legs being equal to space between under side of floor and bottom of downward extension of side walls of furnace jacket; rivets inserted through downward extension of side walls of furnace, also inserted through side legs respectively and riveted to hold downward extension of side walls against leg e, bar being located between mid-length of floor.

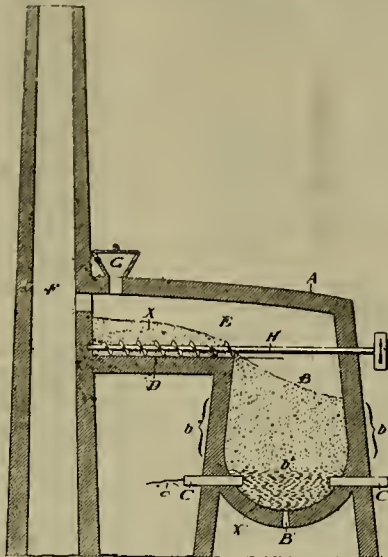
ORE GRADING APPARATUS.—No. 711,650; F. W. Wood, San Francisco, Cal., assignor to Crown Gold Milling Co., San Francisco, Cal.



Grader comprising frame, box or casing having plurality of flat or plane bearing faces, balls on which bearing faces rest, brackets secured to frame, flat bearing plates supported by brackets, in turn supporting balls, retaining rings or flanges carried by plates encircling balls for allowing them limited movement, means for imparting gyratory movement

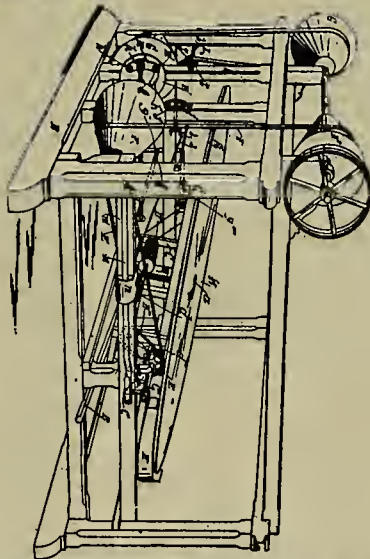
to box, means whereby extent of movement may be varied.

PROCESS OF REDUCING METALS FROM THEIR ORES.—No. 711,738; M. Ruthenburg, Philadelphia, Pa.



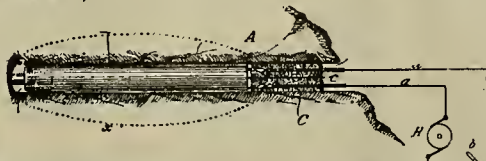
Continuous process of reducing magnetic iron oxide to metallic state, which consists in coating each particle of mass of comminuted ore with reducing material sufficient to reduce that particle; fixing coating separately upon respective particles, by detaining them for definite time in region heated to determined degree less than reducing temperature; retaining preheated material in granular form and progressing it at determined rate into region heated to reducing temperature; reducing ore to metallic state, without fusing it; progressing reduced metal, in granular form, at reducing temperature, into region of fusing temperature and fusing reduced metal.

ORE CONCENTRATOR.—No. 711,903; L. Look, Los Angeles, Cal.



Ore concentrator comprising suitable framing, swinging frame, divided rod journaled on framing, supporting frame mounted on inner ends of divided rod having crank whereby swinging frame is suspended, loose pulley mounted on rod, table mounted on supporting frame, having discharge tube provided with worm wheel within swinging frame, shaft journaled in swinging frame, carrying worm meshing with worm wheel, pulley fixed to worm shaft, connected with rod pulley, vertical rock shaft having fork engaging crank on rod, provided with lateral rod, auxiliary shaft provided with fixed pulley, wheel having wrist pin, arm connecting wrist pin with lateral rod, countershaft having fixed pulley connected with rod pulley, driving shaft having fixed pulleys connected with pulleys of auxiliary and counter shafts.

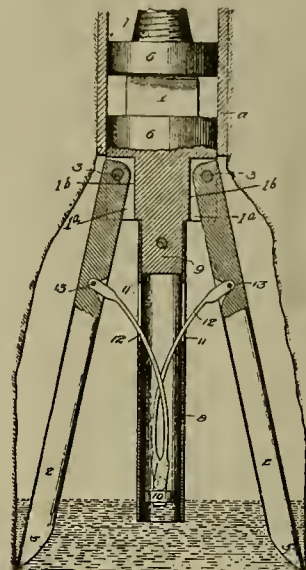
ART OF BLASTING.—No. 711,545; G. Thomson, Elizabeth, N. J.



Improved mode of blasting, which consists of introducing within blast hole an electric furnace and closed vessel containing liquid, closing hole by suitable tamping, passing suitable current through furnace to generate great quantity of heat, continuing this heat un-

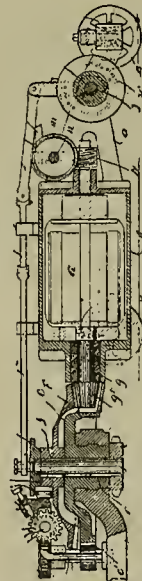
til surrounding rock is heated to high temperature and liquid vessel is opened by heat, whereby to liberate liquid and introduce latter into contact with heated mass so as to suddenly vaporize it, whereby there is generated within hole a pressure sufficient to disrupt mass of rock.

DRILL FOR OIL OR OTHER WELLS.—No. 711,506; W. E. Johnston, Conocoquenessing, Pa.



In reciprocating drill, combination of head or body portion, pivoted pickarms extending downwardly from head or body portion, cylinder, means to detachably connect it to head or body portion so that cylinder will depend therefrom; plunger in cylinder, links connected to plunger, means to detachably connect links to pivoted pickarms.

MINING MACHINE.—No. 711,643; R. E. Noble, Chicago, Ill.



Device comprising frame carrying toothed circular extension on its rear, shaft journaled therein carrying gear wheel, means carried by frame for actuating gear wheel, cutter chain frame pivoted to extension, shaft with gear on lower portion engaging toothed extension, means actuated by gear wheel carried by extension for actuating shaft of cutter chain frame, disk in shaft of extension, drum carried at rear of frame, ratchet wheel connected to drum, double swinging arm pivoted to shaft of drum carrying pawl for engagement with ratchet wheel of drum, arm supported on frame connected to double swinging arm, pitman pivotally connected to arm on frame and to disk, rope connected to drum and to stationary point, whereby entire machine may be moved when drum is operated.

METHOD OF MAKING SODIUM CYANIDE.—No. 711,910; F. Roessler, Frankfurt-on-the-Main, Germany, assignor to the Roessler & Hasslacher Chemical Co., New York, N. Y.

Method of obtaining sodium cyanide, which consists in treating mixture of sodium cyanide and sodium carbonate with sufficient water to bring all the salts into solution, forming lye, evaporating lye in vacuum to degree of concentration at which only sodium carbonate is precipitated, separating precipitated sodium carbonate from solution, depositing crystals of sodium cyanide by cooling, fusing crystals of sodium cyanide in their water of crystallization at about 33° C., whereby cyanide is separated in state free from water.

Mining Summary.

Specially compiled and reported for the
MINING AND SCIENTIFIC PRESS.

ALASKA.

The Oceanic Co. will put in an extensive milling plant on its properties on Sum Dum bay, about 40 miles from Juneau. The properties are located upon two veins, each about 60 feet in width. The development work consists of tunnels and open cuts that disclose ores running in value as high as \$30 to the ton. The company proposes to place a stamp mill with a capacity of eighty tons per day.

The report of the Alaska-Treadwell Co., on Douglas Island, for the year ending May 15, 1902, shows that during the ensuing twelve months there were mined and milled 682,983 tons ore. From the mill tailings were saved by concentration 12,408 tons sulphurets. Free gold from amalgamation in the mill produced \$665,591; 12,660 tons sulphurets treated gave \$639,129, a total of \$1,304,720.

	Total.	Per Ton.
Bullion sold.....	\$1,304,720	\$1.9106
Merchandise profits, etc	34,799	0.0509

Total earnings.....\$1,339,519 \$1.9615

Mining 682,983 tons....	\$ 573,554	\$0.8399
Milling and concentrat'g	125,636	0.1840
Sulph't expense, 12,660 tons.....	97,332	0.1425
General expense, Douglas Island.....	10,656	0.0157
San Francisco office....	6,636	0.0097
London office.....	1,224	0.0018
Paris office.....	224	0.0003
Consulting engineer....	1,253	0.0018
Legal expenses.....	125	0.0002
Interest on overdrafts...	405	0.0006
Bullion charges.....	6,042	0.0088

Total working exp'se. \$ 823,087 \$1.2053
Construction 52,942 0.0775

Total expenses.....\$ 876,029 \$1.2828

Net earnings.....\$ 463,490 \$0.6787

The 300-stamp mill, using water power exclusively, run 214 days 6 hours 6 minutes, crushing 308,632 tons; the 240-stamp mill ran 338 days 23 hours 53 minutes, crushing 374,261 tons; average duty, 4.80 tons per stamp per day in the 300-stamp mill, 4.60 tons in the 240-stamp mill. In the 240-stamp mill steam was used for power 139 days 19 hours 17 minutes, and water for 199 days 4 hours 36 minutes. In the 240-stamp mill one pound steel in the shoes crushed 4.33 tons of ore; in the 300-stamp mill, 4.29 tons. In the 240-stamp mill one pound of iron in the dies crushed 7.88 tons of ore, and in the 300-stamp mill 5.60 tons.

ARIZONA.

COCONINO COUNTY.

The Anita C. Co. of Williams owns 300 acres of copper-bearing land, the ore carrying 3% copper and a little gold and silver. A roasting furnace will be put in.

COCHISE COUNTY.

In the Copper Glance a 90-foot wide boulevard has been laid out from the shaft to Glance station. The El Paso & Southwestern Railroad Co. will build a spur to the mine.

The Wilcox S. & R. Co. has organized to build a customs smelter at Wilcox; incorporators, W. W. Robinson, Tucson; A. Meyer, J. Rinner, H. Brower, E. W. Armstrong, San Francisco.

At Douglas, the Calumet & Arizona furnace will blow in on the 15th inst.

The final payment of the purchase price, \$35,000, of the Last Chance mine has been made by the Canon Copper Co. J. H. Page is manager.

The gallows-frame, 26 feet high, has been completed on the Modern Copper Co.'s property. The company will drill 111 feet below the 90-foot level. An assay taken from the 90-foot level averaged \$37.04.

GILA COUNTY.

Superintendent A. C. Sleboth of the Lake Superior & Calumet M. Co. is developing property on Queen creek.

Superintendent G. S. Adams of the Globe-Boston C. M. Co. is extending the 200-foot level of the Mallory mine and will sink the shaft 250 feet farther, to a depth of 450 feet.

GRAHAM COUNTY.

The Maravilla M. Co. is pushing prospect work in the Lone Star, north of Solomonville. Twenty-five men are sinking the shaft, which has reached a depth of 400 feet with two crosscuts. Several bodies of copper ore have been found.

MARICOPA COUNTY.

L. L. White, near Wickenburg, is developing the Dark Horse mines, owned by the White G. M. Co., in Black Rock district, on the Hassayampa river. A

tunnel, now 600 feet in, is being driven. The ore body is 2½ feet wide; ore values range upward from \$4 gold per ton. The ore is about half free milling and half concentrating.

G. M. Fowler has organized the Arizal G. M. Co., which owns a number and has bonded the rest of the Selso Gradillas mining claims, 12 miles south of the old Vulture mine.

MOHAVE COUNTY.

Early in 1903 J. P. Wallace will begin operations on the Burro mine. A wagon road will be constructed to the Big Sandy and machinery hauled.

Manager O. Kuencer of the German-American Co., San Francisco district, says there are 200 men working in the camp at present. Both the Gold Roads and Leland mines are putting on more men.

PIMA COUNTY.

The Black Warrior Copper Co. will construct an additional 200-ton leaching plant and a 50-ton blast furnace. This will give a combined capacity of 450 tons per day.

W. T. Johnson has bonded for \$50,000 the Ajax hill properties. F. S. Barnum will superintend development work.

PINAL COUNTY.

The first oil in the territory has been found near Florence, which city announces that the Paraffine Oil Co. has a small flow of oil at 700 feet.

YAVAPAI COUNTY.

The Senate mine, adjoining the Congress, is being developed. In a drift on the 340-foot level 6 feet ore has been found.

The Pfau G. M. & R. Co., of Cincinnati, has bought for \$10,000 a group of claims in Cherry Creek district, south of the Gold Ring and the Hettie mines.

A. L. Begbie, representing a Scotch syndicate, has been examining the Copper Chief mine, and it was locally stated that the Scotch people had concluded to take the property. The Los Angeles Mining Review says: They learned that Senator W. A. Clark of the United Verde mines owned the property adjoining the Copper Chief; they also learned that Senator Clark owned the railway between Jerome and Jerome Junction, and, owing to these facts, became alarmed that Senator Clark would some day or another, and whenever it suited his convenience, get them in the "door" and hold them there. They thereupon called everything off, and in doing so lost the best developed prospect in Arizona to-day. The price fixed upon for it was \$1,325,000. There is a probability that Senator Clark will decide to buy it, if he gets the chance.

The Great Verde Co. has a shaft down 225 feet and are sinking through a gravel formation. This is the property on which a mineral indicator, or divining rod, says there is a body of mineral somewhere below the surface, notwithstanding there are no surface indications of a mineral ledge anywhere on the property. The owners still have confidence that when they strike solid formation they will find pay ore.

The Black Hills Co. continues to develop its property south of Jerome with excellent results.

The Monarch Co., in the Cherry Creek district, will add five stamps to their mill.

W. Treadwell has bought one-half of the Picnic group, near Mayer, carrying gold, silver and copper, and will work the claims.

The fire at the McCabe mine has been extinguished by the use of steam. Foreman Massey is given the credit. The main trouble was on the 300-foot level. To that point, down the steam pipe that connected with the lower pumps, he lowered a stick of dynamite and blew the side out of the pipe. Then all the steam that it was possible for the boilers to make was sent down, escaping just where it was needed. All surface openings were tightly sealed. The fire was confined to the timbering of the 300 and 400-foot levels.

The mills on the Congress mine are running almost full time, being hampered somewhat by the deficiency in the water supply. About 500 men are employed. The two principal veins are being developed by six shafts, and a new one has been sunk to a depth of 800 feet and shows more and better ore than the average.

A Jerome report states that over 100 men are kept busy working around the smelter of the United Verde. New machinery is being put in place and the works are being put in good condition generally.

The mine and cyanide plant at the Octave mine in southern Yavapai county is being run to their fullest capacity. About 200 men are employed about the mine and the plants.

The Prospect says the Geo. A. Treadwell Co. has secured the old Boggs mine and the Hackberry, 1 mile west of the

smelter. They also have a pipe line and control of water. It hears that the consideration was \$200,000. E. D. Treadwell will go to work at once on the Boggs. The men are now down 300 feet on the Iron Queen.

CALIFORNIA.

A compilation issued by L. E. Aubury, State Mineralogist, shows the total value of all the minerals produced during the past fifteen years to have been \$346,023,688, of which \$213,990,369 was gold, \$22,375,803 petroleum, \$19,788,337 copper, \$17,918,249 quicksilver, \$12,631,466 silver, \$10,458,649 borax, \$7,513,372 granite, \$6,111,005 clay, \$5,210,070 lime and limestone and \$4,069,548 coal.

ALAMEDA COUNTY.

The six oil storage tanks at Melrose, capacity 14,000,000 gallons, have been completed. The erection of the pumping plant has begun.

AMADOR COUNTY.

The U. S. Supreme Court has ordered a rehearing of the case of the Kennedy M. & M. Co. vs. the Argonaut M. Co., on a writ of error from the California Supreme Court. The Kennedy Co. in 1895 took \$56,000 worth of ore out of the Silva mine. The Argonaut Co. claimed ownership of the ore, because it owned the claim adjoining the Silva, containing a gold vein, having its apex there and dipping toward the Silva, and that the ore was obtained from that vein.

BUTTE COUNTY.

The Blue Lead mine, near Bangor, is to be reopened.

CALAVERAS COUNTY.

The Parnell mine has been closed on account of non-fulfillment of contract. H. S. Messer, owner of the property, has charge of it.

C. P. Williams has begun work on the Claxton mine.

EL DORADO COUNTY.

At the Golden Gate mine Superintendent Richards has a 7-foot ledge of ore.

FRESNO COUNTY.

Superintendent J. Beck of the Minaret mines says eleven men are doing development work. He will start two tunnels to connect all the claims in the group, opening some of them at a depth of 3000 feet. There is abundance of water for power and timber.

INYO COUNTY.

Near Independence, twenty-five men are grading for the new mill at the Reward mine.

Near Bishop, seventeen men are employed by Superintendent Pidge in the Leidy mine, the borders of which have incorporated under the name of the Leidy M. Co.

MADERA COUNTY.

At Grub Gulch Superintendent J. E. Porter in the Gambetta mine has the east drift on the 800-foot level in 440 feet. Shoots are put in every 50 feet and men are put on as fast as there is room for them. After a run of sixty hours, using a 60-mesh screen, \$1800 was taken off the plates and from the trap.

MONO COUNTY.

The Sweetwater M. Co. will run a 200-foot drift and put in a concentrator and slimes plant in the spring.

NEVADA COUNTY.

The Grass Valley Tidings-Telegraph says all the litigation between the Pennsylvania M. Co. and the Grass Valley Exploration Co. is at an end. The Pennsylvania Co. comes into the possession of all property owned by the Grass Valley Exploration Co., including the W. Y. O. D. mine, its hoisting works, 20-stamp mill, concentrators and all the buildings and machinery; the Kate Hayes, Nuttall, Parr, Sims, Grant and New York mines, the mineral right to the Harry ranch, Oliver claim, Crescent mine, and mineral rights of some city lots. Pumping out the W. Y. O. D. from below the 900 level, to which the water was allowed to come, will be proceeded with. It is estimated that it will take at least two weeks to get the water out of the 1100 level, when work will be resumed. The 20-stamp mill of the W. Y. O. D. will begin later on. There is enough ore in sight to keep the 10-stamp mill of the Pennsylvania and their new 20-stamp mill in constant operation. When the water is pumped out and the work of extracting ore is done from the W. Y. O. D. shaft, more men will be put to work.

A new 10-stamp mill for the Grey Eagle mine is at Nevada City.

The Union Blue Gravel mine, North Bloomfield, is to have a tramway in the tunnel.

The Union says the company recently formed to open the South Idaho mine, before unwatering the mine, will construct a dam across Wolf creek at the head of the Stone-Griffith ditch.

PLACER COUNTY.

The Rocky Bar M. Co., North Fork

American river, will clean up the river bed next year by a flume and the aid of their dam.

PLUMAS COUNTY.

E. B. Kimball, representing W. P. Hammond, of Oroville, is examining the Hallsted mine, Rich gulch.

SAN BENITO COUNTY.

At San Jose is organized the New Cerro Benito Q. M. Co.; capital stock, \$2,000,000; \$850,000 subscribed. The company proposes to buy and operate the Cerro Benito quicksilver properties.

SAN BERNARDINO COUNTY.

A ledge of chrysoprase is reported discovered on the desert near Sugar Loaf. It is an apple-green variety of chalcedony, colored by nickel oxide and of possible value in certain tints and hues, being classed with gems.

The Dale correspondent of the Los Angeles Mining Review says the Brooklyn is working night and day, both in mine and mill, handling a fine grade of ore which is being successfully reduced in the mill; the tailings are handled in the cyanide plant recently erected.

H. Ahrens is superintendent Wright & Lawrence M. Co., owning mining properties in Riverside mountain. He has bought the river boat Aztec and will use it in general transportation business, making a trip every forty-eight hours. The ore is copper, averaging 20%, and carries \$10 gold. There are sixteen claims, about 1½ mile from the Colorado. The company will erect a 50-ton water jacket on the river bank.

At the Giant Ledge Co., New York mountain, men are uncovering ore.

The mill on the Gold Bronze mine, at Vanderbilt, is running a 12-hour shift on ores running \$100 per ton. The same company is doing exploration work in the St. George mine with twenty-five men.

SHASTA COUNTY.

S. Ball, foreman Modoc Chief Quicksilver Co., Clover creek, says he has quicksilver ore on that property, and that some samples gave assays as high as 27.5%.

Manager Clark of the California Prospecting & M. Co. is working the Skookum property at Centerville.

J. H. Kendall of the Mount Shasta Mines Co., that has recently acquired the De Lamar property, says after Jan. 1, 1903, the wages of the miners will be \$3 a day instead of \$2.75, the present scale.

The Bully Hill mines and big smelting plant will be lighted by electricity and the plant operated by electric power by Jan. 1, 1903. It will carry 20,000 volts and will be 18 miles long.

The new tramway at the Bully Chooch mine is in operation with increased facilities for handling ore. The present force will be increased to fifty men. A new 10-stamp mill is in operation.

The Redding G. & C. M. Co. has bought the Future placer mine, Buckeye, and the Quartz Gulch mine, Centerville.

Development work begins on the Afterthought mine, held under bond by the Great Western G. M. Co. W. G. Scott is superintendent. Most of the men laid off at the Liberty mine, near Copley, will work on the Afterthought.

The Hiatt mine, A. Morgan superintendent, Quartz Hill district, 5 miles north of Redding, will be reopened Nov. 1. There is a hoisting plant on the property.

F. Hall and A. H. Bigbie have visited the Arps group, near Copper City. The former holds a bond on the property. The latter has been examining it for Eastern people who may become purchasers.

SIERRA COUNTY.

M. Anderson of the Gold Valley M. Co., near Downieville, says that the property of the company will start with increased force next week.

TUOLUMNE COUNTY.

The Dead Horse extension vein, back of Old Town, is considered found. Sinking will determine the best place to erect the hoist.

Sinking is completed at the Grizzly and drifting along the vein for the shoot begun on the ninth and tenth levels.

The shaft at the Del Monte mine is down 100 feet. Water is coming in, about 100 skips a day being hoisted.

In the shaft of the McAlpin mine, on Pino Blanco mountain, Superintendent Riggs will put in new machinery.

At the Cosmopolite mine the machine drill makes about 15 feet per week. J. M. Merrill is operating the mine.

The Sierra G. M. Co. is enlarging the shaft, which will be two compartment. Carpenters are at work on the buildings.

Near Jupiter, the Stockton Gravel M. Co., in the old works, are having a bed-rock tunnel run in on the gravel for some distance, when they intend placing several tons of powder and firing it to loosen the ground so that it will wash easier and more quickly. They have a 45-foot bank of gravel which washes very readily and

20 feet of hard, blue cemented gravel which needs to be broken up with powder and pays well. W. Tucker is superintendent.—The Bourbon mine has resumed.

E. J. Olson, superintendent Star mine, has finished the flume, laying the battens, caulking the flume and rebuilding the car-track. The ore bins at the mill and mine have been repaired.

The Don Pedro gold mines are under bond to W. H. McClintock. They comprise the Don Pedro quartz mine, Stokes mill site, Pay Day mill site, all in Don Pedro Bar district.

It is expected that work will resume in the Arbona mine near Tuttletown. The shaft on the Grizzly is down 1000 feet. Men are at work on the Temescal mine. Twenty stamps at the Confidence mine are daily crushing high-grade ore.

The Independent says Superintendent Scott is considering oil at the Black Oak mine. Tanks have been ordered of 12,000 gallons capacity. The mine will use 1400 gallons per day; it is now burning sixteen cords of wood daily. The cost of water is \$800 per month and wood \$3000. The north drift from the 1045 incline shaft is 345 feet and in ore averaging \$42. The south drift from the 1300 is 247 feet in ore averaging \$11.

YUBA COUNTY.

The War Department has accepted the bid of the Atlantic, Gulf & Pacific Co. for \$27,940.50 for the construction of the first of the restraining river barriers near Daguerre Point; the contractors' work on dam will begin at once.

G. Williams is manager Honeycomb quartz mine, near Camptonville. He will build a 10-stamp mill there this winter.

Work has been resumed at the Honeycomb mine.

Kirkpatrick & Crocker of San Francisco have bonded a quartz mine at Indian Ranch, on which is a \$30,000 plant; active work has been begun.

COLORADO.

ARAPAHOE COUNTY.

(Special Correspondence).—The Colorado Zinc Co., of Denver, is installing a new dryer which will give them increased capacity. For some time past they had difficulty with their screens for sizing, and have finally put in submerged screens—an invention of Superintendent King. Denver, Oct. 25.

BOULDER COUNTY.

The Longfellow mines, at Jamestown, is owned and operated by the New Century Co. They have a fifty-ton concentrating mill, air compressors, drills run by electricity, mine lighted throughout by electricity. The 200 H. P. is developed by a water power plant, 2 miles from the mine, electricity being transmitted over a three-phase wire system. Shipments of concentrates for the last year have averaged \$55 per ton; smelting ore has run \$80 per ton. The main shaft of the mine is 350 feet deep.

At Wall street the Nancy Co. contemplates construction of an electric tramway from and through the Nancy tunnel to the ore bins of Wall Street G. Ex. Co. plant—3000 feet. The chlorination plant of the Wall Street G. Ex. Co. is finished crushing ore this week.

CHAFFEE COUNTY.

C. E. Noble of the Washington G. M. Co., Granite, has 18 inches of gold ore, picked samples of which assay \$1000 to the ton. The specimens are from the strike in the 175-foot level west of the shaft. It extends along the drift for 125 feet.

D. M. Nichols, superintendent Vivandiere, has a lease on the Crete, Turret district. The Anaconda working shaft is being timbered.

The buildings at Cameron were destroyed by fire last week. They had been purchased by the Sunset Con. Co.

The station that is being cut in the Jasper shaft at the 150-foot level is to be 9x10 feet and entirely on one side of the shaft, and timbered with square sets and lagging, the timbers being 10 inches square. In cutting this station the pay streak in the vein was cut and the ore found to be rich. As soon as the station is complete sinking will continue in the shaft and the vein prospected to establish stopes and take out ore for shipment. Assays taken on ore from No. 2 of the group, on which a tunnel is being driven, show values aggregating \$50 per ton in gold, silver and copper.

CLEAR CREEK COUNTY.

Manager Wilcox of the Waldorf mine near Georgetown is shipping. First-grade ore returns average \$73 per ton and second grade \$35 per ton. The company's property totals 1000 acres.

Manager B. C. Catron has reopened the Terrible at Silver Plume.

The Poorman shaft at Freeland will be sunk 300 feet.

The Georgetown Courier says three partners in the Haggart & Co. lease made \$800 each as clear profit during the past

month; a very fine showing for the Alliance and the lessees.

Munroe, Rogers & Haynes have bought the Teller group. John Owen will be manager.

The Union group of claims on Silver mountain is sold for \$35,000 to Kansas and Nebraska men. J. M. Black will have charge.

Six miles north of Georgetown A. E. Reynolds, on the Red Elephant group, projects extension of the tunnel another 1000 feet to intersect and exploit property.

DOLORES COUNTY.

Two hundred more miners will be working in Rico and Pioneer mining districts within the next ninety days, says the Rico News.

Under the direction of A. B. Roeder, the United Rico Mines Co. has been organized and will operate a number of concentration mills.

FREMONT COUNTY.

Florence says that the Victor Fuel Co., operating the Chandler coal mine, on November 1 will voluntarily increase the wages of its employees 5%. M. W. Lewis, labor agent for the company, has gone to Arizona to get more negroes to work in the mines. At present there are 120 darkeys employed.

GILPIN COUNTY.

The Powers M. & M. Co., own and operates the Powers, Hope and Cresceus lode claims, situated in Russell district. The Powers will be used as the main working shaft of the group; this shaft is down 240 feet. Drifting and stoping is being carried on in the 220 east and west levels, the west level showing 3 feet of ore.

Best & Clayton of Idaho Springs have a lease and bond on the Great Mammoth mine in Illinois-Central district, and the lessees will put on a small hoisting plant.

The Alps mine on Quartz hill is worked by a pool of Central City and Nevada mine miners under the management of J. Williams. The main work is being carried on between a depth of 1200 and 1300 feet, where stoping and raising is in progress. This property has two shafts, the main one being 800 feet deep, and from that depth a shaft has been sunk below the level, which is down 500 feet and is called the submarine shaft. The property ships enough ore to supply one battery at the stamp mills and is of fair grade. The smelting ore brings over \$100 per ton, being yellow copper and black jack. The property is owned by H. Sayr of Denver and is worked under a lease.

For the third week in October the shipments of ore from the county amounted to 101 cars, or 2020 tons, bringing the total for the three weeks of the month ending the 23rd up to 309 cars, or 6180 tons.

The Carpenter smelter at Golden has taken off from its treatment charges the silica penalty on all ores running up to \$15 per ton, all above that grade to be charged for excess silica as at present.

The Delmonico mine on Quartz hill has its shaft nearing the 1000-foot point. The company intends to sink 400 feet deeper.

Lessees of the Fannie mine on Cyclops hill, west of Black Hawk, are taking out some silver ores carrying 200 ounces to the ton.

The Hidden Treasure mill on North Clear creek has a 100-ton lot from the North Star property in Vermillion district, operated by the Ann Rutledge M. Co.

Manager Nickerson of the Fairfield G. M. Co. says that the last car of smelting ore from the Fairfield mine in Russell district gave returns of \$149 per ton—an increase of 23% over the returns from the previous shipment. These ores were taken out in development work, in sinking the shaft and in starting off the drains at the bottom.

GUNNISON COUNTY.

(Special Correspondence).—The Ethel G. M. Co., of Denver, will soon erect a hoist on their property at Vulcan. Vulcan, Oct. 25.

The Akron M. Co.'s 2800-foot drainage and transportation tunnel is now in 2300 feet and will furnish an economical avenue of extraction for the ore bodies in Lake hill. The management is in charge of E. R. Harper, ex-Mayor of Akron, Ohio.

The Ute Trail M. Co. has organized under the laws of Wyoming; incorporators, J. A. Freeman, J. A. Beam, M. S. Brown, who hold a lease and bond on the Ute Trail mine. A carload of ore shipped for testing purposes shows one to four ounces in gold.

Near Pitkin, Superintendent Severson on the Calumet is proving up the vein which apexes in the center of Calumet ground.

Near Gunnison, J. McElroy is operating the Bon Ton lode. The ore runs 8% copper and 70% lead. The Hard Cash on Ga-

lena mountain is showing a fine body of copper ore. The Lead King, in the same district, is being operated by Aspen men with good results.

LAKE COUNTY.

The Last Chance mill, Lake county, is being fitted up to treat ore from the Peerless Maud; treat fifty tons per day. Manager Dyatt points out that the main reliance of the Horseshoe district is on the low-grade milling ores.

By November 15 the new mill at the Resurrection mine at Leadville will be completed and ready to treat ore.

The California Gulch Gold Dredging Co. will work the Uintah placer, west of Leadville, next season. A dredging plant costing \$60,000 will be put in. The Uintah placer lies between Stringtown and Malta and contains about seventy acres. The company have been experimenting for some months, and report pay gravel 16 feet below the surface, although the upper wash will also carry gold. The tests showed values of 50 cents per cubic yard. All efforts to work this ground before has been done through sluicing.

At Leadville an attempt will be made to solve the problem of the treatment of the low-grade siliceous ores by means of cyanide by Golob & Turnbull of the Ballard mine, who will put in a sixty-ton plant. In the tests on low-grade ore from the Ixey mine at the plant, near the Arkansas Valley smelter, the talcose material hindered the cyanide solution from leaching through the mass. Breece hill alone can furnish a large tonnage of low-grade ore if cyanide can be made to work successfully there.

Leadville says in the Yak tunnel workings at the breast, a distance of over 12,000 feet from the mouth, the men ran out of the porphyry and encountered the parting quartzite, which is taken to prove that the Leadville formation underlies Breece hill, from which it is argued that in all of the gold properties on the gold belt where gold predominated in the siliceous ores, as well as carrying a fair percentage in the sulphide bodies (when the lower contact is struck), it will carry good values in gold. The values should also be increased in copper. In addition to the discovery benefiting Breece hill, it will also add to the value of many properties, such as the Iron Silver, Moyer, Louisville, A. Y., Minnie and others.

OURAY COUNTY.

Superintendent D. Woods of the Ouray Chief M. Co. is operating the old Portland mine 2 miles east of Ouray, new houses have been built, engines and electrical apparatus to drive electric drills and fifty-ton concentrating mill contemplated. The group consists of thirteen claims. As soon as the electric drills are installed a tunnel will cut a 20-foot vein.

Manager J. S. Reid of the Bonanza mine, Mt. Haydon, has shipped out three cars silver ore. He will start a new tunnel 1100 feet lower down to intersect the Bonanza vein 1051 feet.

SAN JUAN COUNTY.

Over 13,000 tons of crude ore passed through the Silver Lake mill last month.

Ore from the Columbus mine tested by G. H. Shank, who has a bond on the property, returns 65% in lead with lesser values in other metals.

Some specimens ore from the Dewey claim, Tiger basin, shows sylvanite and sweated its gold by a roast.

The International Reduction Co., operating the Good Hope mines at Bear creek, has been reorganized. The property will be worked all winter; it is locally thought that the Gage process reduction works will not be built until next summer.

Manager B. D. Smith of the Silver Queen mine, near Animas Forks, has a 300-foot tunnel being run to tap three ore shoots in the upper level.

The Silver Ledge mill at Chattanooga is completed.

SAN MIGUEL COUNTY.

The San Bernardo mine near Ophir loop will resume.

In Bridal Veil, White's Blue Lake group of properties is leased to Chadwick and Biapp.

SUMMIT COUNTY.

Near Frisco, the Excelsior mill has been put in shape for saving values by Superintendent Colcord.

TELLER COUNTY.

J. U. Bethell, assistant manager of the Par Value M. & L. Co., operating the Mary Cashen property, has in the upper workings 6 feet ore running \$25 a ton.

The weekly report on Stratton's Independence from September 27 to October 3, inclusive, shows the output of the mine yielded a value approximately \$40,000 for the week. On the 30th the shipments ran \$17 a ton, making a gross value of \$4142.50. The best day of the week was on the 27th, when 280 tons of \$23 ore was shipped, yielding a value of \$6440.

Operations at the Portland mine were suspended for a few days last week

for a reason rarely found in gold mining. Three hundred men were idle at the mine waiting for the timbermen to catch up on their work. The Portland employs a large number of timbermen, but the amount of work of this nature was unusually large recently and the timbermen were not able to keep up with the mining operations. The square sets of timbers now being put in at the Portland are said to be for the widest spars ever used in a gold mine. They are timbering a space 120 feet wide and carried up to an indefinite height in the big stope. The Portland has now two bodies of rich ore, one in the seventh level from the No. 1 shaft, the other in the third level from the No. 2 shaft; both bodies glisten with sylvanite.

Victor reports recent development by the Cripple Creek M. Co., lessees, on the Hull City placer and have doubled the output. Ore is being mined at the rate of 1500 tons a month, average value \$40 in gold. The Cripple Creek Co. has the shaft to a depth of 1090 feet and will sink until a depth of 1250 feet is attained. Levels will be run each 100 feet, beginning at 1150 feet. At the 1050-foot level the vein was cut about 50 feet southwest of the shaft. The chute has been opened for over 400 feet at this depth and the face of the drift is still in ore. Two feet is the average width. Screening and sorting is resorted to in securing the \$40 returns.

The Morning Star G. M. Co. has ratified the sale of the company's property to the El Paso Con. G. M. Co. for \$50,000.

IDAHO.

BLAINE COUNTY.

There are two deposits of zinc ore on Wood river, in the War Dance group, on Deer creek, and in the group on Boyle mountain. In the latter group there are bodies 70 feet long of ore that carries an average of 10% zinc, and gold, silver, lead and iron.

In Colorado the average value of 55% zinc ore to the miner, after deducting all costs, including \$15 railroad freight to Galveston, \$2 water freight to Belgium, in addition to insurance, commissions and treatment charges, but not the cost of mining, is about \$8 a ton.

ELMORE COUNTY.

F. P. Willis, superintendent Tahoma mine, at Atlanta, says that four tunnels have been run; the lowest has a depth of 400 feet; ore running \$12 a ton has been opened. The company will next year put up a Chili roller mill, 150 tons daily capacity. The Idaho M. Co., an organization of Philadelphia men, owns the old Monarch and Buffalo. The company has sunk the old shafts 200 feet deeper—total depth, 600 feet. At a depth of 700 feet crosscuts will be run to the ledge—80 feet. These have been known as silver mines, but 45% of the value of the former bullion was in gold.

IDAHO COUNTY.

At Thunder mountain the Dewey Co. has forty men employed; the 10-stamp mill is going; the company is still jealous of "strangers."

SHOSHONE COUNTY.

The Ajax M. Co., controlling eight claims near Burke, has incorporated; J. A., J. S. and A. McAlpin, J. White and J. Henry—all of Burke.

Wallace tells the Spokesman-Review that the good effects of the settlement of the lead trouble, in which every mine in the Coeur d'Alene was allowed an increase in the monthly output, has been increasing so rapidly for the past month that times are much better there at present than they have been for years. Forty additional men have been added to the force of the California Con., Nine-mile gulch. The Mammoth property has employed seventy-five additional men. The other heavy producing properties which stored away the concentrates and ore during the time the trouble was pending have cleaned up and shipped away all the surplus stock and are preparing to increase their forces.

Superintendent J. Thyne of the Golden Chest M. Co., near Murray, will put in a cyanide plant, to be managed by J. G. Forrester, late of Utah.

Manager Derby of the Monarch M. Co., 5 miles east of Murray, has, with the aid of the compressor, been making an average of 10 feet every twenty-four hours, "one day breaking the record by driving an even 15 feet," equivalent to 300 feet per month. The lower crosscut tunnel when finished will be 2900 feet long. It will tap the two main veins about 1400 feet below the surface. The power for compressor and ventilating fans is furnished by flume.

E. E. Rogers of the Gold Creek Con. M. Co., at Oro Fino, owns the Mascot group. There are fourteen claims. The company is sinking an incline shaft on the center ledge. A 10-stamp mill is on the property. Fifteen stamps are in transit.

Superintendent W. Stedman of the Paragon M. Co., 6 miles east of Murray,

will put in a hoist and 3-drill compressor to sink a double-compartment shaft 300 feet deep. The shaft has been started 700 feet from the ledge. At a depth of 300 feet a drift will be run northward 145 feet, where it is expected the vein will be met.

MISSOURI.

JASPER COUNTY.

Joplin says the mine cave-in on the 30th is assuming big proportions. In addition to the seven shafts on the Eleventh Hour tract that were utterly destroyed, the Homestead and Cleveland mines have caved in. The ruined mines were all producers and have paid a half-million dollars in dividends. Five other mines in the immediate vicinity are considered unsafe and have been abandoned.

MONTANA.

BROADWATER COUNTY.

Gold ore is reported again found in the Freiburg mine, 6 miles south of Winston. The Inter-Mountain thinks that the old California idea—that a mine is of no value until it has passed through a lawsuit—if applied to this mine, would prove it to be of incalculable value, as the history of its lawsuits and gunplays would make a book. Carloads of ore have been shipped which netted \$3000 and small lots have been sent to the smelter that ran \$35 to the sack. It is thought the mine will become a regular producer of high-grade gold ore.

CARBON COUNTY.

Red Lodge reports a strike on the Copperopolis property by E. B. Wittich of Livingston. At a depth of 125 feet a 13-foot ore body is rich in gold, silver and copper.

DEER LODGE COUNTY.

The Anaconda Co., on the hill in East Butte, is putting in a new system of drainage by which all the large mines, including the St. Lawrence, Never Sweat, High Ore, Green Mountain, Diamond, Bell, Modoc and Wake-Up Jim, are to be drained of their water through the shaft of the High Ore, which has reached a depth of 2300 feet. Seven large pumps are at work in the High Ore—three on the 1000, two on the 1600 and two on the 2200 level—and there is a 90-foot pump for the reception of the water from the other properties. The High Ore has very little water excepting that which flows in from other mines. A crosscut is being driven from the 2200 level of the High Ore to connect with the lower workings of the St. Lawrence, Anaconda and Never Sweat; when completed, the water of these three mines will flow into the pump of the High Ore and be forced to the 300 level by the large pumps there. At this point a water tunnel carries off from the pumps water formerly raised to the surface.

The Ophir M. Co. has resumed work on its Ophir mine, at the foot of Dakota street, Anaconda. It is being unwatered by the tank method.

The Edith May, Adirondack and Ticon mines, near the Speculator, are to be unwatered and a crosscut driven from the bottom to the vein which passes through the claim. There is a 700-foot shaft on the Edith May which contains good copper ore.

The Pittsburg & Montana Copper Co., organized to develop the Franklin Farrell ground east of Anaconda and to build a smelter, has the work of development in progress in shaft No. 2, which has reached a depth of 800 feet.

FERGUS COUNTY.

At Lewiston the addition to the Barnes-King mill doubles the capacity—now 250 tons per day.

The bond of the Akeley property, in Deaton gulch, in the North Moccasin, taken by E. J. Morrison, expired Aug. 1. Mr. Morrison expects to take up the bond and push work during the winter.

The addition to the plant of the Barnes-King property, in the North Moccasin, is in operation; the mill is treating 170 tons of ore per day. The capacity of the plant has been increased to 250 tons.

FLATHEAD COUNTY.

(Special Correspondence).—The Snow Shoe mine is developing into a producer. A new mill is contemplated.

All the mines on the same contact show up well. The Silver Cable, Choteau, Diamond John, Beefsteak, Way Up and Silver Butte are being operated.

The new strike at Iron Meadow, 6 miles from here, has caused a stampede. Some free gold ore, assaying \$580, has been taken out. The ledge is 14 inches wide.

Work is being carried on at the American-Kootenai mines with electric drills. A body of free milling ore has been struck.

The Brick & Brannegan mine is a steady producer. Snowsheds have been built to work all winter. New plates are put in and the old ones shipped to the smelter for the gold absorbed by them to be recovered.

Cabinet, Oct. 24.

A strike is reported in the Way-Up mine, in the West Fisher district, in one of the three tunnels by which the property is being developed; vein, 12 feet wide-ore, a sulphide that will average \$20 gold per ton.

J. H. Riley, of the Way Up mine, reports three tunnels on the property; in the two upper tunnels the ore is 15 feet wide, average \$20 gold. The ore is a sulphide; some of the gold is free. The walls are slate and quartzite, the ledge filling is shale slate.

In West Fisher district the Gold Leaf claim has cut the vein at six different places; assays \$60 in gold to the ton. The ledge is 12 inches wide, walls slate, the prevailing formation in that section. The Iron Meadow is 6 miles from Cabinet.

GRANITE COUNTY.

A strike is reported from Stony Creek, 16 miles west of Philipsburg, on the property of the Michigan & Montana M. Co., H. Ortman resident manager. The lead in the upper workings is 4 feet wide; assays average \$35 gold per ton.

JEFFERSON COUNTY.

The Helena & Livingston Co. has bonded the Muellers mine, west of Corbin, for \$16,000. Men are taking out ore.

At Corbin, Eastern men have an interest in the Hidden Treasure and Copper King claims, owned by the Colorado M. & D. Co., and will supply money to do development work. The shaft on the Hidden Treasure is 157 feet deep.

H. Freyler, manager New Boston Co.'s ground near Corbin, will develop the company's claims—all on the Badger, one of the group.

LEWIS AND CLARKE COUNTY.

The Red Bird M. Co. is organized to operate the mines of the Panches Bros., R. A. Panches manager. The mines are 2 miles northwest of Austin.

L. C. Alexander, operating the Josephine mine, at Rimini, has a shoot of ore which is assaying \$100 to the ton.

MADISON COUNTY.

At the Red Bluff mine Superintendent Austin will increase the present force of eighteen men.

Near Rochester, at the Watseca mine, there are 113 men employed. The company has one mill in operation and another in the course of erection.

At the Elgin seventeen men are working on each shift.

Ore is being produced by the Kearsarge property, near Virginia City; considerable of it carries free gold.

MEAGHER COUNTY.

W. W. McDowell, lessee and manager of the Daly copper mine, at Copperopolis, has a crosscut on the 400-foot level toward the ore body which was worked on the 300-foot level.

The Morning Star mine, at Castle, is under bond for \$50,000. W. Shakespeare is in charge and is getting out a 1000-ton shipment to the smelter.

RAVALLI COUNTY.

The Wood Placer M. Co.'s holdings near Hamilton have been sold for \$100,000. Thirty-five men will be employed. New flumes will be built.

SILVER BOW COUNTY.

H. Bush, formerly superintendent Black Gulch Co.'s property, has a lease and bond on the Ballaret group of claims in the Highland mining district, 25 miles south of Butte.

A contract for a 200-foot tunnel on the Illinois & Montana M. Co.'s property is let by Manager J. H. Geiger.

NEVADA.

ELKO COUNTY.

S. G. Weston, manager Baltimore group near Elko, says the completion of the tunnel will tap the ledge in the next 400 feet. In the same locality is the White Rock placer mine, successfully operated by Manager Hlgginbotham.

At the Bull Run group the owners, after discharging an indebtedness of \$30,000, are dividing \$6000 per month with twenty stamps dropping.

ESMERALDA COUNTY.

W. Groszinger of Candelaria has received first payment on his \$25,000 sale of coal lands.

The Silver Star Co.'s mines are reported sold to Eastern men.

EUREKA COUNTY.

Ore shipments by rail from the mines of Eureka district for the week ending October 17 were: Eureka Con. 131,300 pounds, Diamond 32,340 pounds, Lincoln 9280 pounds.

LINCOLN COUNTY.

The Nevada-Keystone M. Co., Yellow Pine mining district, on their 300-foot level have an ore body measuring 6 feet in width and assaying \$100 per ton.

At the Wall Street mine, El Dorado canyon, Manager Gracey is putting in a hoist.

LYON COUNTY.

Cutting & Hudgens have bought the Wilson mine at Pine Grove, 25 miles south of Yerington, for \$30,000—one-half cash and the other half in sixty days.

NYE COUNTY.

(Special Correspondence).—There are thirty-three two-compartment shafts now being sunk and considerable new machinery is coming in. The 60-mile pipe line has had considerable preliminary work done, about \$30,000 having so far been expended.

Tonopah, Oct. 28.

J. Healey, superintendent Tonopah & Salt Lake Co.'s properties, says in the Stone Cabin ground he has uncovered 4 feet of high-grade ore, with real extent of body undetermined.

Twenty-five men are doing development work at Southern Klondike, on the Court & Bell property, for the Tonopah Co., which is under a bond for \$75,000, which expires Jan. 1, 1903.

STOREY COUNTY.

The Kinkadee mill is now employing nineteen men, adding \$2000 to the Comstock monthly payrolls.

The drill plant on the Brunswick lode has been set up on the site selected for boring drill hole No. 3 on the line between the Potosi and Occidental. Operations on the new hole will begin when the electric power line to the plant is completed.

WASHOE COUNTY.

The Pyramid Lake M. & M. Co., F. O. Norton superintendent, is developing the property.

WHITE PINE COUNTY.

The Chainman M. Co. has temporarily suspended operations awaiting the meeting of the board of directors on the 7th. W. N. McGill is acting superintendent.

Work on the well at the Keystone is suspended, the pump pulled and other machinery removed. Water for the running of a smelter has not been obtained.

OREGON.

BAKER COUNTY.

At Imnaha, 35 miles down the Snake from a point opposite the Seven Devils, J. A. Hilliker says the work on the surface and depth so far attained indicates copper deposits. Development has penetrated below the oxidized zone on several of the properties, where sulphides running from 6% to 8% copper are revealed. Malachite running 30% to 40% copper is found in the oxidized zone, where leaching has enriched that portion immediately under the surface deposits. Sulphides come in with the water level, which ranges about 50 feet depth. The smelter recently ordered by the Eureka Smelting Co. will treat custom ores, to be located at the mouth of the Imnaha.

Gelzer people have been prospecting ancient river channels at Winterville and at a depth of 130 feet have found gold gravel, upon which they will do some drift mining.

The North Pole Co. has bought a quarter interest in the Villard claim.

Three miles from Sumpter the Gold Pan Co. will sink a 500-foot shaft. The Virginia mine will put in a new stamp mill. C. J. Allen is reopening the Monumental mine.

Near Sumpter, the quartz mill of the Cracker-Oregon M. Co. is ready for the machinery. Two drifts are being run on the ledge. The North Pole mill addition is completed. A contract has been let for a 550-foot tunnel on the Yellow Daisy property, Red Boy district. The air drills in the Oregon-Monarch crosscut tunnel are making a progress of 7 feet per day.

DOUGLAS COUNTY.

Freeport, Ill., owners are at Drew to inspect a mining property owned and operated by the Rainbow M., M. & S. Co. of Freeport, looking into the advisability of building a smelter. The trip is taken on the recommendation of Superintendent H. Banfield. The property consists of a dyke of mineralized porphyry 600 feet wide, carrying three to five paying veins.

JOSEPHINE COUNTY.

The Simmons-Cameron, Wimer, Meredith and Osgood are the principal hydraulic placer mines of the Waldo district. The managers of all of these properties are preparing for the coming winter's work. The managers of the Simmons-Cameron are driving a 1200-foot tunnel through a mountain to new diggings. They will put in a hydraulic elevator to elevate the waste and tailings, as the slope of the gulch in which the new diggings lie is not sufficient to allow dumping grounds for the giants. Three or four giants will be operated at each of these mines.

SOUTH DAKOTA.

LAWRENCE COUNTY.

A. M. Stevenson of the Hidden Treasure mine, adjoining the Homestake mine,

says it is believed to be an extension of that claim. During the six months a great deal of development work has been done and new ore bodies opened up. The report in part reads: "Crosscut No. 1, 1000 feet from the mouth of the tunnel, 450 feet at right angles to and intersecting the big Cheyenne ore body. I stated in my letter of June 8 that the development work upon the properties at that time showed free-milling ore bodies of 80 feet in width, and present development work shows an ore body 186 feet in width, consisting of free-milling ore exceeding \$5 per ton in value. A large shaft house and hoisting plant is nearing completion and a three-compartment shaft is being sunk at the west end of crosscut No. 1, west from the main working tunnel. This shaft is about 100 feet deep and in fine pay ore. Some siliceous ore bodies show an average value of \$13 per ton. The mill will have a capacity of 260 tons per day and will be in operation Jan. 1, 1903."

The Clover Leaf M. Co. is running thirty stamps at the mill, and will drop sixty; to supply the additional stamps with water, a ditch and flume have been put in to bring water from Elk creek. The ore is being mined on the lower level, 500 feet deep, where the vein has been developed by crosscut within the last few months, 100 feet deeper than the company was working a year ago.

C. C. Griggs is putting in a dryer of his own construction at the Wasp No. 2 cyanide plant on Yellow creek. It is of brick, 2x5 feet, built alongside the ore bin and reaching from the tramway to the crusher floor below, at an angle of 45°, the sides lined with 1-inch holler iron, top and bottom with 1-inch cast iron. The furnace furnishes heat for the dryer by the passage of smoke above and below the dryer twice its length before entering the smokestack. The device is to dry the shale ores to prevent their clogging the crusher. The clay from these ores is difficult to handle in the tanks, being almost impervious to the solution and rendering reasonable extraction almost impossible. The Wasp Co. ore is mined in an open cut, quartzite and porphyry lying nearly flat over 20 feet thick. It is common for one blast to break down enough ore to run the mill ten days. It is trammed 1400 feet to the mill.

At Roubaix the Uncle Sam shaft of the Clover Leaf M. Co. is 600 feet deep. The mill is running on ore from the fifth level of the mine. The company has been troubled with water above the 500-foot level. It is all caught on the 500-foot at present, and below that the shaft is comparatively dry.

UTAH.

JUAB COUNTY.

Manager Packard of the Star Con. of Tintic has made connection with a new independent vein of ore in the south drift off the 300-foot level. Assays show \$30 gold, twenty-five ounces silver per ton.

PARK COUNTY.

Superintendent J. Brooks of the California Co. concentrator at Park City expects next month to be crushing 100 tons of ore daily, producing twenty tons concentrates.

SUMMIT COUNTY.

A. J. Fern, manager Western Monitor M. Co. in Iron canyon, will work the property all winter.

Superintendent M. C. Harrington of the Keystone is sinking and will put in a new hoist.

WASHINGTON.

FERRY COUNTY.

The management of the Quilp, at Republic, has contracted to ship 600 tons of ore monthly to the smelter.

STEVENS COUNTY.

At Northport, J. Watson, metallurgist at the smelter, has three furnaces in operation and is treating about 600 tons of ore per day; next week the fourth furnace may be blown. The smelter has sufficient coke for present needs.

Near Hedley City, Similkameen, the owners of the Nickel Plate mine and group of claims are proceeding with the construction of a tramway and water flume, preparatory to installing a 60-stamp mill and concentrating plant.

FOREIGN.

BRITISH COLUMBIA.

The Cariboo Goldfields Co.'s yield is estimated for the season at \$20,000. The hydraulic elevator is working successfully. The Cariboo hydraulic's results of the second and final wash-up of the season at this mine amount to \$17,500 in gold, making the total yield of the year \$61,000. The falling off is ascribed to deficiency of water supply caused by the slight snowfall of last winter.

J. H. Moran of New Denver has bonded for \$60,000 the West Fork group in Thunder Hill camp, on the headwaters of

the North Fork, 100 miles north of Grand Forks. The ore in a 3-foot ledge gives values of \$100 per ton in silver and copper. It is owned by F. Fritz and C. W. Harrington of Grand Forks.

The B. C. mine, Summit camp, will ship 3000 tons monthly to the smelter.

The Crofton smelter, Vancouver Island, water jacket furnace is capable of handling 400 tons a day.

George A. Ohron, U. S. Consular agent at Rossland, says: "Nine mines are now shipping to the smelters in Washington and British Columbia. A few months ago only two of these were shipping, and that in small quantities. The labor troubles have now been adjusted and the mines are all working. The following table shows the average shipment for one week:

	Tons.	Value
Le Roi.....	4022	\$52,286
Le Roi No. 2.....	420	5,460
Center Star.....	1350	17,550
War Eagle.....	900	11,700
Glant.....	155	2,015
Velvet.....	150	1,950
Total.....	6997	\$90,961

"A few years ago the mines around Rossland could not afford to ship ore valued at less than \$16 per ton. The charges for freight and smelter treatment amounted to \$14. Later, these charges were decreased to \$11 per ton, and about a year ago the smelters reduced the rate for freight and smelting to \$6.50 per ton. A recent contract made by the War Eagle and Center Star mines with the smelter enables them to ship ore valued at \$5 per ton, although they ship a quantity of high-grade ore with the low grade. The terms of the contract between these mines and the smelter are \$4.50 per ton for freight and treatment. This is most important for the future prosperity of Rossland, the majority of ore mined around the city being of low grade. With these cheap rates for freight and smelting there are hundreds of mines in the immediate vicinity of Rossland which will become shippers almost immediately."

The Noble Five, near Sandon, has closed down.

In Rossland it is thought likely that the Le Roi and Le Roi No. 2 may consolidate. The Miner says that the two mines made an aggregate profit of \$81,000 in September—Le Roi \$63,000 and Le Roi No. 2 \$18,000.

Details for the Le Roi's operations are as follows: Shipped from mine to smelter 13,667 tons, containing 6778 ounces gold, 12,144 ounces silver and 580,000 pounds copper. Shipped from dump to the smelter 1998 tons, containing 660 ounces gold, 930 ounces silver and 50,720 pounds copper.

Le Roi No. 2: The shipments for September amounted to 6070 tons, containing 2645 ounces gold, 6030 ounces silver and 125 tons copper. The returns from ore, after making a reduction of all smelting charges, amounted to \$39,500; cost of mining, \$21,500; profit, \$18,000.

The Mines Exchange, Ltd., of Nelson reports from the Silver Glance that the owners have a bonanza. Four cars of ore were recently shipped to the smelter which netted about \$12,000.—The tramway to connect the Venus with the Athabasca mill will be ready for operation next month.—The Chicago National Development Co. is pushing work on the Carthage group, North Fork of Wild Horse creek; two tunnels have been run on the vein—488 and 135 feet, respectively.—A strike on the Double Standard claim, adjoining the Hunter V mine, shows ore rich in native silver.

The total amount of ore shipped from the Slocan and Slocan City mining divisions for the year 1901 was approximately, 30,000 tons. From Jan. 1 to Oct. 11, the shipments reached 22,914 tons.

A. C. Garde, manager Payne mine, has an option on the Linsay and Knob Hill groups of mineral claims, Canyon creek, Trout Lake district.

The recent discovery made on the Rossland-Criterion, owned and operated by the Ophir Lode Syndicate, and the strike on the Bearice, shows the extent of the Fish Creek Camp.

CHINA.

The ninth article of Sir James Mackay's new treaty with China provides that the Chinese government will promptly and earnestly examine the existing mining regulations, and will form new ones which shall offer no impediment to the employment of foreign capital in the exploitation of the mineral wealth of the country.

MEXICO.

CHIHUAHUA.

At Batopilas, Chihuahua, the Batopilas S. M. Co. shipped \$112,000 worth of bar silver and concentrates in September from the Todos Santos mine; it was expected that the shipments would reach \$125,000 in October. This vein has yielded

since July, 1901, \$1,500,000 silver. E. A. Quintard, a son-in-law of Gov. Sheppard, has been superintending the property since the latter's death. L. H. Stevens has been elected general manager and has gone to Batopilas.

SONORA.

The Oasis hears that the Pilares de Teras silver mines, beyond Nacosari, have been sold to W. C. Greene of Cananea for \$250,000 gold. Mr. Green will operate them upon an extensive scale. The ledge is 12 feet in width.

On the western slope of the Sierra Madres the Rio Yaqui International Transportation and Metallurgical Co., recently incorporated under the laws of Arizona, has plans for building a 24-furnace smelter and refinery at San Antonio de la Huerta and constructing 300 miles of railroad to connect the various mines owned by the company with the smelter and also with the sea coast.

San Antonio, the site of the smelter, is in the heart of the country in which the mines owned by the company are located. The farthest one is 21 miles from the smelter site. These properties will be connected with the smelter by railroads.

Work on several of the properties will begin. V. A. Lucier, vice-president and assistant general manager of the company, is at St. Louis to meet Eastern men who have become interested in the company. The party will return to Denver and leave for Mexico, where arrangements for the letting of the contracts for the building of the smelters and railroads will be made. It is expected that a number of the furnaces of the smelter will be ready to be blown within a year.

NEW ZEALAND.

The gold output of the colony for the month of September amounted to 57,783 ounces, of the value of \$222,466, as compared with 51,087 ounces, valued at \$195,696 in September, 1901.

THE KLONDIKE.

Dawson has shipped ten and a quarter million dollars in gold since the opening of navigation last May.

The statement of the export of gold from Dawson to the outside as furnished by Territory Comptroller J. T. Lithgow is as follows:

Month.	Ounces.	Value.
May.....	1,326 06	\$ 19,890 75
June.....	236,673 44	3,550,324 55
July.....	154,208 38	2,313,130 70
August.....	145,032 88	2,175,493 64
September.....	146,454 68	2,196,778 10
Total.....	683,695 44	\$10,255,617 74

Commercial Paragraphs.

FAIRBANKS, MORSE & Co. of Denver report having sold so far this season over fifty railroad track scales from 80 to 100 tons capacity.

BROWN, BEAL & Co., Mills Building, San Francisco, are now the agents of the Trenton Iron Co., Trenton, N. J., vice the late N. M. Bell.

N. A. CHRISTENSEN, formerly of the Christensen Engineering Works, has sold his interests therein and has gone into the air compressing line himself. His office is 1212 Herman Building, Milwaukee, Wis.

The Denver Engineering Works Co., Denver, Colo., have orders for one electric hoist for the Federal Lead Co.; three electric hoists for Montezuma Lead Co., Chihuahua, Mexico; one electric hoist for Mine & Smelter Supply Co.; also have orders for five electric drills and one 50-stamp mill.

HENDRIE & BOLTHOFF MFG. & S. Co., Denver agents for the New Century drop motion jig, report a rapidly increasing demand for this appliance. They are equipping the Rawley mill at Bonanza, Colo., the Ellshart mill at Chloride, A. T., the Daly Judge mill at Park City, Utah, and the Big Five mill at Ward, Colo.

THE Colorado Iron Works Co., Denver, Colo., are in receipt of orders for the following material: One two-table concentrating plant complete and one reverberatory smelting furnace for the Keystone Copper Smelting Co., Guadalajara, Mexico; a cyanide plant to be operated under the pneumatic cyanide system for Hall & McConnell, Deadwood, South Dakota; this consists of six 14-foot leaching tanks, together with gold, sump and solution tanks.

A. J. MOXHAM, late general manager Dominion Iron & Steel Co., Sydney, C. B., has bought from Mrs. E. DuPont the DuPont Powder Works at Wilmington, Delaware. The price paid is said to exceed a million dollars. The plant is the largest of its kind in the world and manufactures the bulk of the powder used in the United States, including the smokeless article. It is understood that the Haggerty Powder

Co. is about to be absorbed by the DuPont Co.

A LARGE Jeanesville pumping engine, capacity 1000 gallons per minute for lift of 1000 feet, at the Golden Cycle mine, Independence, Colo., was shipped from the factory at Jeanesville, Pa., on Oct. 10. This pump was sold by the Western office of the Jeanesville Iron Works Co., 1328 Seventeenth St., Denver, Colo., and is fitted with the latest economic improvements, such as Corliss valves, Rochester automatic power lubricator, Wyoming steam eliminator and a 10"x14"x18" steam condenser.

Personal.

J. H. HAMMOND is at Tonopah, Nevada.

R. FLEISCHER is manager Nogales M. Co., Sonora, Mex.

L. MONAHAN is foreman Iron Mountain mine, Shasta, Cal.

W. G. SWART of Denver, Colo., has returned from the East.

N. E. LINSLEY has returned to Spokane, Wash., from Alaska.

W. I. CRAIG is superintendent Yampa group of mines, Bingham, Utah.

F. N. COX is superintendent Nogales Copper Co., Minas Prietas, Mex.

H. ZERBE is superintendent Cygnet Co.'s properties, Stockton, Utah.

H. EDWARDS has returned from Dawson, N. W. T., to Salt Lake City.

P. H. CONNELL is manager Lake Superior G. M. & M. Co., Sonora, Mex.

L. R. POUNDSTONE has returned to Graniteville, Cal., from San Francisco.

P. ARGALL has returned to Denver, Colo., from a trip through Old Mexico.

R. A. PARKER is at Las Vegas, N. M., for the winter, much improved in health.

S. W. WEST is resident manager the Dirigo-La Sal M. & M. Co., Basln, Utah.

E. P. JENNINGS has returned from the East to Ryan, Coconino county, Arizona.

J. R. RYAN has been re-elected superintendent Con. Virginia M. Co., Virginia, Nev.

W. A. HALL of San Francisco is examining mining property at Silver City, Nev.

H. R. CHANNING, manager of the Highland Boy, Bingham, Utah, has gone East.

CHAS. BUTTERS has returned from England and is at Virginia, Nevada, this week.

CHARLES SNYDER is manager the Western Ore Purchasing Co., Reno, Nevada.

D. FERGUSON is superintendent International Copper Co.'s properties, La Sals, Utah.

R. C. FACER is manager the Golden Opportunity M. & M. Co., Silver City, Idaho.

J. BAIER, manager Conrey Placer M. Co., Virginia City, Montana, has gone to Boston.

JNO. D. MCGILLIVRAY, of Dawson, N. W. T., is in San Francisco en route to London.

C. BARMORE, manager Elkhart mines, returned to Kingman, Arizona, from Denver, Colo.

H. W. HARDINGE of Denver returned recently from Mexico and is now in New York City.

C. AMONSON, manager Trade Dollar M. Co., has returned from California to Wallace, Idaho.

J. J. PHELAN, manager Sweetwater mines, has left Mono, Cal., for Bridgeport, Conn.

R. C. WILLIAMS is superintendent the South Mountain mining properties, Silver City, Idaho.

G. E. ALEXANDER, who has been visiting southern Kansas, has returned to Denver, Colo.

A. B. FRENZEL, Telluride, Colo., is manager of a company that mines and ships uranium.

F. S. ADAMS has returned to San Francisco from an inspection of Tonopah, Nev., property.

DANA HARMON has returned to San Francisco from a four weeks' sojourn on the Atlantic coast.

W. E. DEITY is at Tubutama, Sonora, Mex., to report copper find made by the Sonora M. & M. Co.

GEO. STARR, superintendent Empire mines, has returned to Grass Valley, Cal., from San Francisco.

W. H. WILEY of Idaho Springs, Colo., is in Mexico reporting on mines for the Montana Copper Co.

ABBOT A. HANKS has recently returned to San Francisco from making an

examination of the magnesite mines of the Martel M. Co., near Livermore, Alameda county, Cal.

W. H. STORMS has returned from an examination of Arizona mining property to Sutter Creek, Cal.

D. H. JACKSON of Tonopah, Nevada, is in San Francisco and contemplates an extended Eastern trip.

J. P. REUTER has resumed superintendence of the Mt. Gorman M. & M. Co.'s operations, Dunton, Colo.

J. H. STRITE, who has been building a mill at the Tomboy, Smuggler, Colo., has returned to Redding, Cal.

M. W. HOYLE of White Oaks, N. M., has been through Montana and Idaho looking at mining properties.

A. E. BARLOW of the Canadian Geological Survey has returned to Ottawa from the Sudbury mining districts.

D. J. CONNERS, formerly of the Copper Queen, is now superintendent of the Golden Era mine, Bisbee, Ariz.

J. E. DAVIDSON has gone to Gold Hill, Oregon, to take charge of the property of the Gold Hill & Bohemia M. Co.

GEO. H. STRONG of Dewey, Strong & Co., the San Francisco patent attorneys, who has been ill, is convalescent.

C. E. JOHNSON of Deadwood assumes the position of chief engineer of the Horseshoe M. Co., South Dakota.

C. DENNIS, formerly of Nevada City, Cal., is superintendent Santa Felicitas G. M. & M. Co., Cabora, Sonora, Mexico.

C. P. WILLIAMS, of Boston, Mass., is at Angels, Cal., looking after his mining interests, his first visit there since 1852.

J. A. PARKER has returned to Oakland, Cal., from an examination of the Ford copper property, Georgetown, Cal.

E. P. PORTER, of the U. S. Geological Survey, and who is collecting statistics as to the output of mines, is at Downieville, Cal.

D. J. SAYER, late superintendent Butterfly-Terrible mine, San Miguel Co., Colo., is examining Baker county, Or., mining property.

GEO. S. BINCKLEY, general manager Esperanza M. Co., Cedros Island, Mexico, returned there this week from San Francisco, Cal.

E. B. VAN OSDEL, metallurgical engineer Spokane, Wash., Smelting & Refining Co., has returned from Baker county, Or.

D. E. BIGELOW of the Union Iron Works, San Francisco, goes to Prescott, Arizona, to build a mill for the Golden Link M. Co.

N. P. WOOD, metallurgist, recently of Tucson, Ariz., and Sonora, Mex., has opened an office at 1757 Champa street, Denver, Colo.

W. HOOPER succeeds J. Hite on the 1st as manager Capital M. & T. Co., Georgetown, Colo., Mr. Hite resigning on account of ill health.

D. J. SAYER has resigned the superintendency of the Butterfly-Terrible M. Co., Telluride, Colo., and has been succeeded by J. McManis.

THEO. POINDEXTER, of the Hercules Gas Engine Co., San Francisco, is touring the Orient, and expects to return, via New Zealand, next June.

W. C. MADGE has resigned his position with the Anaconda Copper M. Co. and goes to Bruce mines, Ontario, as mill superintendent Rock Lake M. Co.

R. AINSWORTH of the firm of Wm. Ainsworth & Sons has returned to Denver from a trip through southwestern Colorado and Salt Lake City, Utah.

JNO. A. MOORE has resigned at the Chamberlain Co., Boulder, Colo., to take the position of metallurgist at the Rambler M. & S. Co., Laramie, Wyoming.

J. M. BALDWIN, of Lead, South Dakota, goes to Ashanti, Africa, accompanied by C. Henley, of Central City; E. S. Smith, of Keystone, and other Black Hills men.

D. W. PARK, assayer of the Merced M. Co., Coulterville, Cal., has resigned to accept a like position with F. Klepetko at the McCune-Haggin property, Peru, S. A.

T. F. NEELEY is now superintendent American Nettle mine, Ouray, Colo., succeeding R. G. Hall, who is at Paradox, Colo., manager of that copper mine and smelter.

W. R. VAN LIEW has resigned at the Washoe smelting plant, Anaconda, Montana, and goes to Globe, Arizona, to assume charge as superintendent of the Old Dominion Copper Co.'s smelting plant.

F. L. SIZER, M. E., has returned to Butte, Montana, after a four months' absence in Chihuahua, Mexico, and reports great mining activity in that portion of the State of Chihuahua where he is operating.

MISS B. M. STEWART and MISS H. M. DILLINGHAM, late managers of the Silver

Mountain M. Co. and the Clear Creek County mill, Empire, Colo., are in California. They are succeeded in the management by F. Bishop.

CURTIS H. LINDLEY returns from San Francisco to the Cour d'Alenes next week to argue the Kellogg, Idaho, Tunnel case, and later goes to Washington, D. C., to appear in the U. S. Supreme Court in the Argonaut-Kennedy case.

J. T. MORROW is appointed superintendent the Boston & Montana smelters, Great Falls, Mont., the position left vacant by the removal of C. W. Goodale to Butte. Mr. Morrow was formerly assistant superintendent. A. E. Wheeler succeeds Mr. Morrow.

E. C. BARNARD, of the Topographical Survey, U. S. G. S., at Needles, Cal., regarding survey of the arid lands on the Arizona and California side of the Colorado river, says that an equal area will be thoroughly investigated on both sides of the river. The topographers will survey down the river 60 miles and map the country on both sides of the Colorado river in equal areas.

F. GUTERMAN is appointed general manager of the Colorado plants of the American Smelting & Refining Co., Carl Eilers, assistant general manager; E. L. Newhouse becomes assistant to the executive committee, with headquarters in New York; J. B. Grant and Dennis Sheedy, members of the executive committee of the company, are to represent the committee in Colorado; A. R. Raht is appointed consulting metallurgist. "The idea," says D. Guggenheim, "is to give the younger men a chance." Manager Guterma will be in charge of eight plants in Colorado—two at Denver, four in Pueblo, one in Leadville and one in Durango.

Obituary.

A. J. PRITCHARD, discoverer of gold in the Cour d'Alenes, Idaho, twenty years ago, died at his log cabin in Murray on the evening of October 3, after a long illness.

DR. A. R. C. SELWYN, C.M.G., L.L.D., F.R.S., for many years director of the Geological Survey of Canada, died at his residence in Vancouver, B. C., on the 25th inst., at the age of seventy-eight years.

JOHN MINEAR, boss timberman at the Iron Mountain mine at Keswick, Cal., died on the 18th inst. from effects of the gas he inhaled during the progress of a fire in the mine. He was fifty years of age, a native of Cornwall, England.

Catalogues Received.

Wisconsin Graphite Co., Pittsburg, Pa., samples of their graphite and mineral paints and descriptions thereof.

The Christensen Engineering Co., Milwaukee, Wis., three handsome booklets: "Christensen Air Brakes," "Electrical Machinery," "Electric Railway Equipment."

Catalogue C of the Triumph pumping engines, made by the S. W. Luitwieler Co., 405-7 N. Main street, Los Angeles, Cal., a detailed account of the Triumph pump and its practical workings, with sectional views, guarantees, testimonials, etc.

The Abbe Engineering Co., standard size 6x9 inches; 46 pages; conveniently arranged compilation of illustrated information on their pulverizers, describing their construction and operation. Issued by the Abbe Engineering Co., 220 Broadway, New York.

Catalogue No. 21 of the W. S. Tyler Co. of Cleveland, Ohio, is an artistic showing of their wire cloth and screens for all purposes, the subject being gone into in a detailed way that is at once interesting and valuable to anyone in any way interested in this important part of mill work. The subjects of wire gauges, mesh, size, weight and length of steel wire; iron and steel wire cloth; price lists of double-crippled wire cloth, brass or copper, etc., are presented in most attractive style, the description being full, and the illustrations of a superb finish that makes them artistic. There are 121 different items in connection with the business that are separately treated of. The handsome book will be sent upon request to any address.

Books Received.

"The Shining Mark and the Mining Shark" is a booklet by F. G. Shaffer, Idaho Springs, Colo., disclosing the devious ways of the deceiver who sells deluded people worthless mining stock. It is an expose of imposition practiced on innocent and ignorant buyers, and if it were in the hands of those tempted to invest their little savings would keep them from fooling their money away.

"Lead Smelting." The construction,

equipment and operation of lead blast furnaces, and observations on the influence of metallic elements on slags and the scientific handling of smoke, finely indexed and in compact shape for reference. Much of it is original, and what is not has been compiled with intelligence. It is written by M. W. Hes, 12mo. viii + 228 pages, illustrated. Cloth, \$2.50 net. Postage 9c. additional. New York, John Wiley & Sons.

Recent Mining Decisions.

Specially Reported for the MINING AND SCIENTIFIC PRESS.

RELOCATION OF MINING CLAIM INURES TO BENEFIT OF ALL COTENANTS.—Where the question was whether \$100 worth of work had been done on a mining claim in the year 1898, and the witnesses of the complainant was to the effect that it had been done, and a witness of the defendant stated that in 1897 the tunnel (the only work done) was in depth 35 or 40 feet, and another witness of the defendant testified that in the fall of 1897 it was 40 or 50 feet, saying that he had measured it the day before and found it to be 89 feet, and further testified that 12 or 14 feet of work was done after December 31, 1898, and defendant's witnesses testified that they estimated the work of the tunnel to cost \$4 to \$5 per foot, such evidence was sufficient to show that over \$100 worth of work had been done in the year 1898. If the required amount of work is done, it is immaterial whether all of the cotenants do their proportionate part of such work. Where it is shown that the required amount of work has been done, it will be presumed, in the absence of evidence to the contrary, that it was done by the cotenants, or some of them. And where one of several cotenants attempts to relocate a mining claim his act inures to the benefit of all the cotenants. The mere lapse of time does not dissolve the relationship of cotenancy.—(Yardwood v. Johnson, Sup. Ct. Wash., 70 Pac. Rep. 123.)

WHEN COMPLAINANT WILL BE ENTITLED TO TRIAL AS TO FRAUDULENT RELOCATION.—A complaint alleged that one of the defendants, who was a cotenant of the complainant in a certain mining claim, had relocated the claim on behalf of another, and that it was not open to relocation, as all the required work had been done on the claim; but that if it had not been done it was owing to the fraud of such defendant, who had for consideration contracted with complainant to do the latter's required work. The prayer was for an accounting, injunctive relief, that complainant be decreed the owner of a certain interest, and for general relief. Defendant urged that the complaint was defective in that the specific cause of action relied on was uncertain. The court held that the contention had no merit, the cause of action being the withholding of the interest; and if the required work had been done the relocation was a cloud on complainant's title, and if not defendant might be found to be a trustee, and such relief as the pleadings and evidence warranted might be given under the prayer for general relief. And it was proper for the lower court not to compel the plaintiff to elect whether he would stand on the allegation that the required amount of work was not done, or that if not it was through the fraud, etc., of the defendant; since more than one set of facts might establish the wrong complained of.—(Yardwood v. Johnson, Sup. Ct., Wash., 70 Pac. Rep., 123.)

FOREMAN MAY BE FELLOW SERVANT.—A coal yard was provided with steel cables, on which, in unloading vessels, buckets holding about a ton were lifted and hauled to the point where the coal was to be dumped, where a device called a "tripper" or "dumper," coming in contact with the latch on the bucket, caused it to empty. The trippers ran on trolley wheels along the cables and were moved to and held in proper place by ropes. When the place of emptying the buckets was changed one or two of the workmen handled the rope, and another, standing by the tripper, told him when it was at the proper place. The foreman, wishing to empty coal into a certain hopper, directed two men to let the tripper down to such hopper, and said he would tell them when it was in the right place, this being commonly done by members of the force doing the general work. They let it down 10 or 15 feet too far, and before it was pulled back a bucket of coal was hauled up on the cable and emptied at such point just as another employe working in the yard in the performance of his duties passed under, and he was injured. There was no defect in the apparatus, and no negligence claimed, other than in placing the tripper in the wrong place. The court held that in assisting in the change in the tripper the foreman acted as a fellow servant of the injured employe, and

that the coal company was not liable for the negligent manner in which such work had been done. (Okonski v. P. & O. Coal Co., Sup. Ct. Wis., 90 N. W. Rep.)

MINING REGULATIONS NOT RETROACTIVE IN CANADA.—The suppliant by right of discovery under the Dominion Lands Act and the Dominion mining regulations of 1889, may thereafter patent a grant of a certain gold mining claim in the Yukon district in December, 1896. His grant, among other things, gave him, for a term of one year from its date, the exclusive right to all proceeds realized therefrom; and the rights which it conferred upon him were, it was declared, those laid down in the Dominion mining regulations, and no more, and were subject to all the provisions thereof, whether the same were expressed in the grant or not. During the currency of the original grant an order in council was passed making grants of gold mining claims in the district subject to a royalty. Afterwards, namely, on Dec. 7, 1897, the suppliant's grant was renewed, on the same terms as those expressed in the original grant. It was held that the terms of the renewal should be construed by reference to their meaning in the original.

RIGHTS OF COTENANTS UNDER CANADIAN MINERAL LAW.—The sheriff in possession of a free mining claim has no power to take out a special free miner's certificate, under Section 4 of the Canadian Mineral Act as amended by the Act of 1889, in favor of a judgment debtor; neither has the sheriff power to renew a certificate before lapse. Where one or more of the cotenants of a mining claim allow their certificate to lapse their interest at once vests, pro rata, in their former cotenants. (McNaught v. Van Norman, Sup. Ct. Brit. Col., 9 B. C., R., 131.)

New Patents.

DEWEY, STRONG & CO.'S SCIENTIFIC PRESS PATENT AGENCY, 330 Market St., S. F., has official reports of the following U. S. patents issued to Pacific coast inventors:

FOR THE WEEK ENDING OCTOBER 21, 1902.

711,612.—FRUIT DIPPER—W. K. Allen, Newberg, Or.
711,552.—FLOATING DOCK—J. E. Blackwell, Seattle, Wash.
711,830.—FLOATING FISH TRAP—A. C. Burdick, Portland, Or.
711,554.—ASSAYERS' FURNACE—A. C. Calkins, Los Angeles, Cal.
711,822.—NUT LOCK—F. Cavallaro, San Jose, Cal.
711,845.—SINK—Fountain & Myers, Oxnard, Cal.
711,892.—FLOW—V. T. Gilchrist, Benicia, Cal.
711,659.—NECKTIE HOLDER—Graham & Goddard, Oakesdale, Wash.
711,850.—AWNING—C. S. Hamilton, Salem, Or.
711,903.—CONCENTRATOR—L. Look, Los Angeles, Cal.
711,904.—COKE APPARATUS—T. S. C. Lowe, Pasadena, Cal.
711,905.—COKE APPARATUS—T. S. C. Lowe, Pasadena, Cal.
711,573.—MEAT NEEDLE—T. H. Means, Waitsburg, Or.
711,579.—HAMMOCK SUPPORT—W. H. Morehouse, Wasco, Or.
711,732.—LIFTING JACK—C. Mykolashuk, South Bend, Wash.
711,587.—ICE VEHICLE—F. H. Ober, Seattle, Wash.
711,884.—PROPELLER—V. Sjostrom, Los Angeles, Cal.
711,802.—FOLDING SATCHEL—J. Trevelthan, Berkeley, Cal.
711,804.—PUMP—Webster, Hall & Stadler, Bakerfield, Cal.
711,602.—COW'S TAIL HOLDER—F. S. Weed, Thorp, Wash.
711,650.—ORE GRADER—F. W. Wood, S. F.

Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

LAND GAUGE ATTACHMENT FOR PLOWS.—No. 711,892. Oct. 21, 1902. V. T. Gilchrist, Benicia, Cal. Assigned to Baker & Hamilton of San Francisco, Cal., a corporation. This invention relates particularly to that class of plows known as "disk" plows, and has for its object to provide a simple means of changing the line of the furrow wheels in relation to the draft and of raising and lowering the frame in order to regulate the width and depth of cut of the plows. It consists of a land gauge attachment for plows comprising in combination a tongue pivoted to the plow frame, a vertical axle adjustably supported on said tongue and movable therewith, a sleeve casting turnable about said axle, a non-rotatable wheel standard slidable in said casting, lever mechanism by which said casting is turned on its axis, a segmental rack pivoted on said casting, a lever fulcrumed on said rack, connections between said lever and the wheel standard whereby the sleeve is raised or lowered, and accordingly the plow frame, to vary the depth of cut of the plow, and an adjustable pivotal connection between the plow frame and said rack.

NUT LOCK.—No. 711,823. Oct. 21, 1902. F. Cavallaro, San Jose, Cal. This invention relates to a nut locking device which is especially designed for securing fish-plates by which the meeting ends of railway rails are united in such a manner as to prevent the nuts starting off by the pulsations of passing trains, and thus loosening the connection, while at the same time the device has sufficient play to allow the expansion and contraction. It consists in the combination in a nut lock of plates having bolt holes made therethrough and adapted to clamp the parts to be secured, corrugations formed radially about the bolt holes, bolts passing through said holes having heads upon one end,

said bolts having lugs formed beneath the heads and to engage the bolt holes to limit the turning of the bolt, and screw threads upon the opposite ends, nuts fitting said screw threads having the inner ends corrugated and washers interposed between the nuts and the plates, said washers having one surface corrugated to engage the nut corrugations, and an extension upon one side of the washer.

Latest Market Reports.

SAN FRANCISCO, Oct. 31, 1902.

METALS.

SILVER.—Per oz., Troy: London, 23½d (standard ounce, 925 fine); New York, bar silver, 50½c, refined (1000 fine); San Francisco, 50½c; Mexican dollars, 40c San Francisco, 39½c New York.

The exports of silver from the United States for the nine months ended September 30, 1902, decreased \$5,907,390; imports during the same period decreased \$3,789,067; net decrease in exports, \$2,118,323.

COPPER.—New York: Standard, \$11.00@11.25; Lake, 1 to 3 casks, \$11.95; carload lots, \$11.75; Electrolytic, 1 to 3 casks, \$11.75; carload lots, \$11.60; Casting, 1 to 3 casks, \$11.75; carload lots, \$11.60. San Francisco: \$14.00. Mill copper plates, \$17.00; bars, 18@24c. London: £52 1s 3d spot per ton.

C. M. Palmer of the Butte & Boston Copper Co. says: "I do not share in the belief that at 11 and 12 cents a pound copper can not be mined at a profit. With higher prices, it is apparent from past experience that the volume of consumption will be materially reduced, and this at a time when new properties are continually being opened and developed, is bound to result in such an overproduction as will be disastrous. With the price of copper at the first-named figure, I am confident there will be a market for all that can be mined. Copper consumers do not take readily to the substitution of other metals except in times when they think the ruling price is excessive. Indications point to a large advance in the volume of production within the next ten years. At the present time the Lake Superior district is but touched. That is a belt extending 150 miles or more that will some day be one continuous copper-producing section. Considerable work is also being done in Arizona. Mining experts believe that the Treadwell mines will develop into large copper producers. The copper mines of Mexico are also attracting the attention of investors, and development work and exploration are being pushed by companies holding concessions. The great ore bodies of Alaska are still untouched. It is known that there is copper all along the coast, but it is not as yet demonstrated how far down operations need to be extended to get at the best of the copper deposits.

"In my opinion, copper can be mined at a net cost of 9 cents a pound, and a ruling price of 11½ cents gives a better margin of profit than is to be obtained in the average commercial enterprise. Since I first came to Butte, and since the first organization of the Butte & Boston Co., the processes of smelting and reduction have been marvelously transformed. It is but reasonable to suppose that new and improved methods will be found to possess merit. The consumers of copper are familiar with the cost of mining and will resent vigorously any attempt to make them pay more than a fair price over and above the cost of production. This resentment will take the form of using other metals, although it has been found that copper is preferred at the right price. From what I have been able to learn, there is small danger of aluminum being used as a substitute to any considerable extent."

LEAD.—New York, \$4.12½; Salt Lake City, \$3.50; St. Louis, \$4.00; San Francisco \$4.50, carload lots, 4½c 1000 to 4000 lbs.; pipe 5½, sheet 6, bar 5½c; pig, \$4.75. London: £10 15s per ton.

SPELTER.—New York, \$5.45; St. Louis, \$4.50; London, £19 5s 0d per ton; San Francisco, ton lots, 6½c; 100-lb lots, 7c.

ANTIMONY.—New York, Cookson's, 9½c; Hallett's, 8½c; San Francisco, 1000-lb. lots, 10c; 300 to 500 lbs., 11c; 100-lb. lots, 13@15c.

TIN.—New York, pig, \$27.00; San Francisco, ton lots, 28c; 1000 lbs., 28c; 500 lbs., 28c; 200 lbs., 28½c; less, 29c; bar tin, \$3.32c. London, £120 12s 6d spot.

PLATINUM.—San Francisco, crude, \$18.00 per oz.; New York, ingot, \$19.00 per Troy oz. Platinum ware, 75@80c per gram.

QUICKSILVER.—New York, \$48.00 large lots; London, £8 15s; San Francisco, local, \$45.50 per flask of 70½ lbs.; Denver, \$49.25. Export, \$44.50.

BABBITT METAL.—San Francisco, No. 1, 10c; No. 2, 7c; No. 3, 6½c; extra, 17½c; genuine, 35c; Eclipse, 37½c.

ALUMINUM.—New York, No. 1, 99½ pure ingots, 35c; No. 2, 90½, 30c to 34c.

SOLDER.—Half-and-half, 100-lb. lots,

18½c; San Francisco, Plumbers', 100-lb. lots, 15½c.

NICKEL.—New York, 50@60c per lb.; ton lots, 45@48c.

STRUCTURAL MATERIALS.

IRON.—Pittsburg, Bessemer pig, \$22.75; gray forge, \$20.50; San Francisco, bar, 3c per lb., 3½c in small quantities.

STEEL.—Bessemer billets, Pittsburg, \$29 and \$30.00; open hearth billets, \$32 and \$33.00; San Francisco, bar, 7c to 12c per lb. CHICAGO CURRENT QUOTATIONS.

Bessemer.....	\$25.00@25.50
Foundry Northern 1.....	24.50@26.00
Northern 2.....	24.00@25.00
Northern 3.....	23.50@25.00
Southern 1.....	25.15@26.15
Southern 2.....	24.15@25.65
Southern 3.....	23.00@25.15
Forge.....	23.65@24.65
Charcoal.....	26.00@26.50
Billets, Bessemer.....	33.00@34.00
Bars, iron.....	1.85@1.95
Bars, steel.....	1.75@1.85
Rails, standard.....	28.00@30.00
Rails, light.....	34.00@40.00
Plates, boiler.....	1.90@2.00
Tank.....	1.75@1.80
Sheets, 26 store.....	3.25@3.40
No. 27.....	3.35@3.50
No. 28.....	3.45@3.60
Angles.....	1.75@1.80
Beams.....	1.75@1.85
Tees.....	1.80@2.00
Zees.....	1.75@2.25
Channels.....	1.75@2.25
Steel melting scrap.....	19.50@20.00
No. 1 railroad wrought.....	21.00@22.00
No. 1 cast, net ton.....	17.50@18.00
Iron rails.....	24.50@25.00
Car wheels.....	21.00@22.00
Cast borings.....	10.50@11.00
Turnings.....	14.50@15.50

CEMENT.—Germania, \$3.00; K. B. & S., \$3.10; Hewmoor, \$3.00; Trowell, \$3.00; Portland, \$3.35 per bbl.

LIME.—Santa Cruz, \$2.25; Roche Harbor, \$2.25 per bbl.

LUMBER.—(Retail): Pine, ordinary sizes, \$20.00@22.00; extra sizes higher; redwood, \$22.00@23.00; lath, 4 feet, \$4.25 @4.50; pickets, \$19.50; shingles, \$2.35 for No. 1 and \$2.00 for No. 2; shakes, \$13.50 for split and \$14.50 for sawed; rustic, \$26.00 @32.00.

NAILS.—Per keg (list prices): No. 20 to 60d, Wire, \$3.30; Cut, \$3.30; 10d to 16d, Wire, \$3.35; Cut, \$3.35; 8d, Wire, \$3.40; Cut, \$3.40; 6d and 7d, Wire, \$3.50; Cut, \$3.50; 4d and 5d, Wire, \$3.60; Cut, \$3.60; 3d, Wire, \$3.75; Cut, \$3.75; 2d, Wire, \$4.00; Cut, \$4.00. Special rates for car-load lots.

GENERAL SUPPLIES.

POWDER.—F. o. b. San Francisco: No. 1, 70% nitro-glycerine, per lb., in carload lots, 15½c; less than one ton, 17½c. No. 1*, 60%, carload lots, 13½c; less than one ton, 15½c. No. 1** 50%, carload lots, 11½c; less than one ton, 13½c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2* 35%, carload lots, 9½c; less than one ton, 11½c. No. 2** 30% carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 725 kegs, \$1.50 per keg; less car lots, \$2 per keg.

CAPS.—3x, \$5.50 per 1000; 4x, \$5.50; 5x, \$6; Lion, \$9, in lots not less than 1000.

FUSE.—Triple tape, \$3.60 per 1000 feet; double tape, \$3.00; single tape, \$2.65; Hemp, \$2.10; Cement No. 2, \$3.00; Cement No. 1, \$2.65, in lots of 3000 feet and up.

CANDLES.—Granite 6s, 16 oz., 40s., 10½c per set; 14oz., 40s., 9½c.

COAL.—San Francisco, coast, yard prices: Wellington, \$8.50; Seattle, \$6.50; Coos Bay, \$5.50; Southfield, \$8.00. Cargo lots, Eastern and foreign: Wallend, \$6.50; Brymbo, \$7.50; Pennsylvania, hd., \$14.00; Scotch, \$8; Cumberland, \$12; Cannel, \$9.00; Welsh Anthracite, \$13.00; Rock Springs, \$8.50, long ton; Colorado Anthracite, \$14.00. Coke, \$10.50 per ton in bulk, \$13 in sacks; Sunnyside, \$8.50, long ton.

CHEMICALS.—Cyanide of potassium, 98%-99%, jobbing, 27@28c per lb.; carloads, 25@26c; in 10-lb. tins, 38c; sulphuric acid, in carboys, 66% B, 2c per lb.; soda ash, \$2.00 per 100 lbs.; hyposulphite of soda, 24@3c per lb.; blue vitriol, 5½@6½c per lb.; borax, concentrated, 7@8c per lb.; chlorate of potash, 12@13c; roll sulphur, 3c; alum, \$2.00@2.25; flour sulphur, French, 3½@3¾c; California refined, 2@2½c; nitric acid, in carboys, 8c per lb.; caustic soda, in drums, 3@4c per lb.; Cal. s. soda, bbls., \$1.25 @1.50 per 100 lbs.; sks., \$1.05; chloride of lime, spot, \$2.50@2.60; nitrate of potash, in bbls, 8c; caustic potash, 10c in 40-lb. tins; sulphide of iron, 9c per lb.

OILS.—Linseed, boiled, bbl., 57c; cs., 62c; raw, bbl., 55c; cs., 60c; lots of 5 bbls., 1c less; Lucol oil, boiled, bbl., 50c; cs., 55c; raw, bbl., 48c; cs., 53c. Kerosene—Pearl, per gal., 20c; Astral, 20c; Star, 20c; Extra Star, 24c; Eocene, 25c; Elaine, 22c; Water White, in bulk, 13½c; Mineral

Seal, iron bbls, 19c; wooden bbls., 22½c; cs., 25c; Mineral Sperma, cs, 26½c; Deodorized Stove Gasoline, bulk, 17c; do., cs., 23½c; 86° Gasoline, bulk, 21c; do., cs., 27½c; 63° Naphtha or Benzine, deodorized, in bulk, per gal., 16c; do., in cs., 22c; Lard Oil, No. 1 bbl., 95c; cs., \$1.00; Neatsfoot Oil, bbl., 70c; cs., 75c; No. 1 bbl., 55@57½c; cs., 57½@60c; Sperma, crude, 55c; Natural White, 66c; Bleached do, 70c; Whale Oil, cs, 55c.

WHITE LEAD.—Per lb., in kegs: Five tons and over at one purchase, per lb., 6c; 1 ton and less than 5 tons, per lb., 6½c; 500 lbs. and less than 1 ton, per lb., 7c; less than 500 lbs., per lb., 7½c; in 25-lb. tin pails, ¾c per lb. above keg price; in 1 and 5 lb. tin cans, 100 lbs. per case, 2½c per lb. above keg price. Dry Lead—in bbls., 1 ton and over, 6c; do. in kegs, 6½c.

RED LEAD AND LITHARGE.—One ton and over at one purchase, per lb., 6c; 500 lbs. and less than 1 ton, per lb., 6½c; less than 500 lbs., 7c.

ASSAY LITHARGE.—Per lb., 8½c.

BISMUTH.—Subnitrate, per lb., \$1.60.

BONE ASH.—4c per lb.

BORAX.—Crystal, 7c; calcined, 25c.

CHROMIUM.—(90% and over) per lb., \$1.25.

COPPER.—Carbonate, 20c; Red oxide, ½ lb., 60c.

MANGANESE.—(90% and over) ½ lb., \$1.25.

MERCURY.—Bichloride, ½ lb., 90c.

MOLYBDENUM.—25c. ½ gramme; 1000 grammes—2½ lbs.

PHOSPHORUS.—(American) ½ lb., 80c.

SILVER.—Chloride, ½ oz., 75c; nitrate, 55c.

SODIUM.—Metal, ½ lb., \$1.00.

URANIUM.—Oxide, ½ lb., \$3.50.

ZINC.—Metallic, chemically pure, ½ lb., 50c.

ZINC.—Dust, ½ lb., 10c.

ZINC.—Sulphate, ½ lb., .04c.

(These prices are wholesale, f. o. b. San Francisco, unless otherwise noted.)

ASSESSMENT NOTICES.

LARKIN MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, near Placerville, El Dorado County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 29th day of September, 1902, an assessment (No. 14) of two (2) cents per share was levied upon the capital stock of this corporation, payable immediately in United States gold coin to the secretary, at the office of the company, 112 Main street, San Francisco, California. Any stock upon which this assessment shall remain unpaid on the 1st day of November, 1902, will be delinquent, and advertised for sale at public auction, and unless payment is made before, will be sold on MONDAY, the 24th day of November, 1902, to pay the delinquent assessment, together with the costs of advertising and expenses of sale. By order of the Board of Directors.

Office—112 Main street, San Francisco, California.

MARINA MARSICANO GOLD MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Sunny Hill, Shasta County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 29th day of September, 1902, an assessment (No. 22) of two cents per share was levied upon the capital stock of this corporation, payable immediately in United States gold coin to the secretary, at the office of the company, 415 Front street, San Francisco, California. Any stock upon which this assessment shall remain unpaid on the 1st day of November, 1902, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 24th day of November, 1902, to pay the delinquent assessment, together with the costs of advertising and expenses of sale. By order of the Board of Directors.

Office—415 Front street, San Francisco, California.

THE CALIFORNIA DEBRIS COMMISSION, having received applications to mine by hydraulic process from J. E. Jones, in Jones' mine, near Bullards Bar, Yuba County, Cal., drainage into Oregon Creek which reaches Yuba River; and from J. F. Cowdery, in Browns Flat Mine, near St. Louis, Sierra County, Cal., drainage into Slate Creek which reaches Yuba River; gives notice that a meeting will be held at Room 96, Flood Building, San Francisco, Cal., Nov. 3, 1902, at 1:30 P. M.

THE CALIFORNIA DEBRIS COMMISSION, having received applications to mine by hydraulic process from Prosper LeComte, John Craig and Joseph Depot, in Barton Hill Placer Mine, near Strawberry Valley, Yuba County, Cal., drainage into Lost Creek which reaches Feather River; from Beattie Mining Co., in Beattie Mine, near Georgetown, El Dorado County, Cal., drainage into Canon Creek which reaches American River; and from Big Butte Gold Mining Co., in Big Butte Gold Mine, near Berdaos, Butte County, Cal., drainage into Butte Creek which reaches Sacramento River, gives notice that a meeting will be held at Room 96, Flood Building, San Francisco, Cal., Nov. 17, 1902, at 1:30 P. M.

THE CALIFORNIA DEBRIS COMMISSION, having received applications to mine by hydraulic process from Prosper LeComte, John Craig and Joseph Depot, in Barton Hill Placer Mine, near Strawberry Valley, Yuba County, Cal., drainage into Lost Creek which reaches Feather River; from Beattie Mining Co., in Beattie Mine, near Georgetown, El Dorado County, Cal., drainage into Canon Creek which reaches American River; and from Big Butte Gold Mining Co., in Big Butte Gold Mine, near Berdaos, Butte County, Cal., drainage into Butte Creek which reaches Sacramento River, gives notice that a meeting will be held at Room 96, Flood Building, San Francisco, Cal., Nov. 17, 1902, at 1:30 P. M.

SITUATIONS WANTED.

CYANIDE CHEMIST, AMALGAMATOR AND ASSAYER wants position. School of Mines graduates. References extending over 10 years. Address "Chemist," ears of Mining and Scientific Press.

Wanted, position, preferably in charge of operations at gold mine. Graduate of one of the best Eastern technical schools. In mining course; several years' active experience in California mine, including both underground and mill work. Can give list of references as to character and ability. Address C. H. W., care Mining and Scientific Press.

Open for engagement after Jan. 1, as manager or asst. manager. Now manager for American Mining Co. in Mexico. Technical mining education and years of actual experience. References and bond furnished. Address "Ocampo Durango," this office.

WANTED.—Graduate Engineer of the College of Mining, University of California, with four years' practical experience, desires position as assistant to the general manager or superintendent of reliable mining company; location immaterial, but Mexico preferred. At references as to character and ability. Address "Engineer," Mining and Scientific Press, San Francisco.

Mining Engineer wants position as superintendent. Practical miner, millman, cyanider and assayer. Experience extending over twelve years. Graduates School of Mines. Address A. R. S. M., this office.

COMPETENT SUPERINTENDENT wants position in California; 15 years' experience in running mines, mills and smelters for profit, and managing men. College bred and technically educated. Formerly held positions as assayer, mining engineer, accountant, superintendent, and manager. Member A. I. M. E. High testimonials. Address "Superintendent," Box 813, Seattle, Wash.

A young man, 30 technical graduate, with several years' experience in this country and in Spanish America, last in charge of a cyanide plant in Mexico, desires position. Assistant superintendent or surveyor whers careful, conscientious work would be appreciated is preferred, though an offer to take charge of a cyanide plant would be considered. References. Address A. B. C., this office.

Experienced mining man wishes to meet capitalists who desire his services in looking up mines and prospects of smelt, with a view to bonding or purchasing the same. Is thoroughly acquainted with the important mining districts of Mexico, where he at present knows of propositions very worthy of consideration. Would be willing to open up and develop a property. Address C. F. L., this office.

WANTED.

WANTED.—A man thoroughly familiar with the reduction of quicksilver ores, to take entire charge of mines and furnaces. Address, giving references, "Quicksilver," care of Mining and Scientific Press, 33½ Market St., San Francisco, Cal.

WANTED.

A First-Class Mechanical Draughtsman Thoroughly Familiar with Mining Machinery. First-class position. Address Box 29, this office.

WANTED.—A Gold Property or Dredging Land.

Gives location, description, prices, etc. Address Box 12, this office.

FOR SALE.

Button Balance for Sale CHEAP.

John Taylor & Co. \$100 Balance. Guaranteed as good as new. NO REASONABLE OFFER REFUSED. Address Sordee, this office.

A GOLD MINE FOR SALE.

Over \$100,000 worth of ore in sight. Water power, machinery and 20-stamp mill on the premises. Address M. Z. F., this office.

BARGAIN—Two 6-Foot Belt, Union Concentrators.

Used two months. LEGG & SHAW, Nevada City, Cal.

The Mines Exchange, Ltd.

MINES and MINING STOCKS.

Address nearest office for reports or quotations.

OFFICES:
Nelson, 1006 Chicago Opera House Bldg., Salmoo, B. C.
Chicago, Ill. Idaho.

BUSINESS OPPORTUNITIES

I CAN SELL YOUR BUSINESS no matter where it is. Send description, state price, and learn how. Established 1896. Highest references. Offices in 14 cities. W. M. Ostrander, 1550 N. A. Bldg., Philadelphia.

Largest Manufacturer in
Joplin of
**MINING
MACHINERY**
OF ALL KINDS.
J. W. FREEMAN,
Joplin, Mo.
Correspondence Solicited.

HENRY CAREY BAIRD & CO.,

INDUSTRIAL PUBLISHERS, BOOKSELLERS & IMPORTERS,
810 Walnut St., Philadelphia, Pa., U. S. A.

Our New and Revised Catalogue of Practical and Scientific Books, 92 pages, 8vo.; a Catalogue of Books on Metallurgy, Mining, Prospecting, Mineralogy, Geology, Assaying, Analysis, etc.; a Catalogue of Books on Steam and the Steam Engine, Machinery, etc.; a Catalogue of Books on Sanitary Science, Gas Fitting, Plumbing, etc., and our other Catalogues and Circulars, the whole covering every branch of Science applied to the Arts, sent free and free of postage to any one in any part of the world who will furnish his address.

An Encyclopedia of Useful Technical Knowledge. A Great Labor, Time, and Money Saver for Practical Men.

Prices \$2.00.

Free of Postage to Any Address in the World.

THE
ENGLISH AND AMERICAN MECHANIC.
AN EVERY-DAY HAND-BOOK FOR THE WORK-SHOP AND THE FACTORY.

Containing several thousand Receipts, Rules, and Tables indispensable to the Mechanic, the Artisan and the Manufacturer. By B. Frank Van Olse. A New, Revised, Enlarged and Improved Edition. Edited by Emory Edwards, M. E., Author of "Edwards' 900 Examination Questions and Answers for Engineers and Firemen." Illustrated by 85 engravings. One volume, 500 pages, 12mo., closely printed; the matter covers an extremely wide range of useful technical information for all classes of mechanics and other practical men.

A Circular of 24 pages, showing the full Table of Contents of this valuable book, will be sent free and free of postage to any one in any part of the world who will furnish us with his address.

HENRY CAREY BAIRD & CO.,
INDUSTRIAL PUBLISHERS, BOOKSELLERS & IMPORTERS,
810 Walnut St., Philadelphia, Pa., U. S. A.

Duncan's Practical Surveyor's Guide.

The Practical Surveyor's Guide: Containing the necessary information to make any person of common capacity a finished Land Surveyor, without the aid of a Teacher. By Andrew Duncan, Land Surveyor and Civil Engineer. A new, revised and greatly enlarged edition. Illustrated by 72 engravings. 214 pages, 12mo., bound in cloth.

Price \$1.50 by mail free of postage to any address in the world.

ABSTRACT OF CONTENTS.—Introduction; Object of Surveying; What a Survey should include; Definition of Points; Determination of a Straight Line and of a Plane Surface; Map of a Survey; Scale according to which Maps of Surveys are Drawn; Instruments for Measuring Distances and their Use; Instruments for Setting out Right Angles and their Use; Survey of Small Tracts with the Assistance of the Previously Described Instruments; Problems; Trigonometrical Surveying; Tables of Surveys; Systems of Rectangular Surveying for Surveying the Public Lands of the United States; Index.

A Circular, 4to, showing full table of contents of this useful book, will be sent to anyone furnishing his address.

HENRY CAREY BAIRD & CO.,
INDUSTRIAL PUBLISHERS, BOOKSELLERS & IMPORTERS,
810 Walnut St., Philadelphia, Pa., U. S. A.

Thallner's Tool-Steel.

Indispensable to All Tool Makers and Tool Users.

JUST READY.

Tool-Steel: A Concise Hand-book on Tool-Steel in General; its Treatment in the Operations of Forging, Annealing, Hardening, Tempering, etc., and the Appliances therefor. By Otto Thallner, Headmaster and Master in Chief of the Tool-Steel Works, Bismarckhütte on the Saale, Germany. Authorized Translation from the German by William T. Brant. Illustrated by 69 engravings. 196 pages, 8vo.

Price \$2.00, free of postage to any address in the world.

CONTENTS.—Introduction. I. Composition of Tool-Steel and its Classification according to it. II. Classification of Tool-Steel according to the Degree of Hardness and the Purpose for which it is to be Used. III. Observations on the External Appearance of Commercial Tool-Steel. IV. Observations on the Fractures of Steel, with regard to the Structure in the Hardened and Non-Hardened States. V. Practice of the Fire-Treatment of Steel. VI. Appliances for Annealing Steel. VII. Appliances for Hardening Steel. VIII. Hardening of Tool-Steel in General. IX. Hardening of Tools which are to be Hardened in Their Entirety. X. Hardening of Tools which are only to be Partially Hardened. XI. Cooling of Tools in Hardening and Devices for this Purpose. XII. Liquids Used in Quenching Steel. XIII. Tempering of Hardened Steel, and Devices for this Purpose. XIV. Straightening Tools. XV. Case-Hardening and Preventions against Surface Decarburization and Overheating. XVI. Welding of Steel. XVII. Regeneration of Steel which has been Spoiled in Fire. XVIII. Investigations of Defects of Hardened Tools. XIX. Improving the Properties of Strength of Steel. Appendix. Index.

The above or any of our Books sent by mail, free of postage, at the publication price, to any address in the world.

An Illustrated Circular of 3 pages, quarto, giving the full Table of Contents of this important book, will be sent free of postage to any one in any part of the world who will furnish his address.

HENRY CAREY BAIRD & CO.,
INDUSTRIAL PUBLISHERS, BOOKSELLERS & IMPORTERS,
810 Walnut St., Philadelphia, Pa., U. S. A.

If you are anxious to cut down operating expenses in your steam plant, send for catalogue telling how.

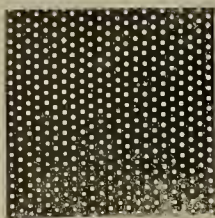
HOWARD H. FIELDING,

Boston Building, DENVER, COLO.

CHICAGO SCHOOL OF ASSAYING.

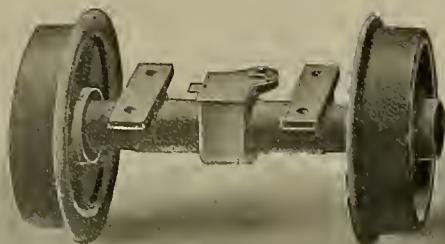
Courses in Assaying and Ore Testing. Courses in Chemistry and Chemical Analysis. Courses for Miners and Prospectors. Instruction individual. Enter any time. Open evenings. J. DUNRAVEN YOUNG, Director, 1735 Monadnock Building.

American Engineering Works, CHICAGO, ILL.



We Will Send SAMPLES of Perforated Metal Screens.

Suppose you ask us for samples of such screens as you prefer. We make all kinds—Round Hole, Plain, Diagonal and Horizontal Slot. Indented Slot both Horizontal and Diagonal. We can make our closest quotations on specification of kind and number of sheets required. We also punch Tinned Screens. Get our circular No. 4. If you want to try a set of our screens we will make them for you at a special trial price. We know they are good, and we want every man who has a battery of stamps to have the same knowledge. We are bidding for your permanent patronage and will maintain the quality of our screens with the utmost care.



ANACONDA SELF-OILING AXLES,

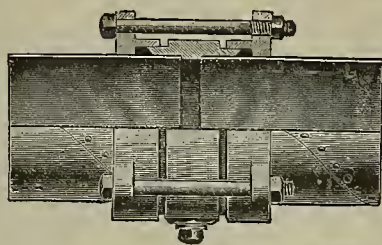
in point of smooth running, durability and economical use of oil, are "far and away" superior to any wheel equipment on the market. We have stock at Denver, Salt Lake City and San Francisco ready for prompt shipment.

AT SAN FRANCISCO (RIX WAREHOUSE).

- | | | | | | |
|---------|-----|-----------------|---------|-----|--------|
| 10 Sets | 10" | Cast Iron | Wheels, | 18" | Gauge. |
| 12 " | 10" | " | " | 20" | " |
| 40 " | 12" | " | " | 18" | " |
| 40 " | 12" | " | " | 20" | " |
| 10 " | 12" | Manganese Steel | Wheels, | 20" | Gauge. |

Spiral Riveted Pipe.

While we make slip joint and ordinary flanged and riveted joint pipe, we recommend as the best that can be used our **BOLTED JOINT**, shown in the accompanying cut. We will be glad to explain its advantages and to make you a low bid to supply your entire pipe line fitted with these bolted joints.



SPRING STOP COCKS.

We have a long list of customers who are well pleased with our AMEW spring cocks for compressed air lines. They stop the loss of power (often a serious one) by leakage where common cocks are used. Many other mines might use these at a saving. Is yours one of them? We would be glad to have you arrange to try them.

We make sizes $\frac{3}{4}$ ", 1", $1\frac{1}{4}$ ", $1\frac{1}{2}$ " and 2".

UTAH AGENTS: UTAH MINING MACHINERY & SUPPLY CO., SALT LAKE CITY.
CALIFORNIA AGENTS: RIX COMPRESSED AIR & DRILL CO., SAN FRANCISCO.

GENERAL ELECTRIC COMPANY'S Electrical Mining Apparatus

Does away with long steam piping, and of leaking compressed air joints. It saves the miner from the high temperatures due to steam piping, it preserves the mine timbers through the absence of moisture, and costs far less for repairs and renewals than any other system of mine operation.

General Office: Schenectady, N. Y.

San Francisco Office: Claus Spreckels Bldg.

Denver Office: Kittredge Building.

Crocker-Wheeler Company, Manufacturers and Electrical Engineers.

AMPERE, N. J.

San Francisco Office, 200 Fremont St.

Denver Office, 535-17th St.

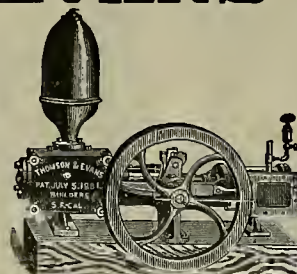


The motor that will increase your tool output.

C. H. EVANS & CO., Machine Works.

Thomson & Evans
Steam Pumps.

DEEP WELL
and
POWER PUMPS.



MARINE ENGINES.

SHIP and STEAMBOAT
WORK.

PIPE CUTTING, Etc.

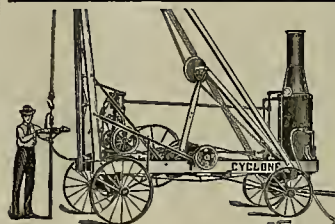
183-185-187 Fremont St.
SAN FRANCISCO.

The Fresno Scraper.

3 1/2-4-5 Foot.



FRESNO AGRICULTURAL WORKS,
FRESNO, CALIFORNIA.



For Prospecting for
COAL, WATER, OIL, GAS,
and PLACER MINING.
THE CYCLONE DRILLING MACHINE CO.
ORRVILLE, OHIO.

INVENTORS, Take Notice!
L. PETERSON, MODEL MAKER,
544A MISSION STREET, bet. First and Second Sts., SAN
FRANCISCO. Experimental machinery and all kinds
of models. Tin and brasswork. All communica-
tions strictly confidential

HEALD'S BUSINESS COLLEGE

And School of Practical Sciences.

24 Post Street, - - - San Francisco.

MINING AND CIVIL ENGINEERING DEPART-
MENT: Mathematics, Drafting, Strength of
Material, Chemistry, Assaying, Blow-Pipe Analysis,
Geology, Mineralogy, Surveying, etc.
ELECTRICAL DEPARTMENT: Theory and
Practice; Construction. Mechanical Drawing.

BUSINESS: Bookkeeping, Shorthand, Typing by
touch, Modern Languages, etc.

Twenty-eight teachers; individual instruction; can
enter at any time; Catalogue and Journal free.

INSIST UPON HAVING YOUR

Bevel
Gears
Planed!



This insures a perfect bearing of teeth which
is impossible to attain by any other means.

P. T. Taylor & Co.

PLANES BEVEL GEARS.

525 MISSION STREET, SAN FRANCISCO.

MINING AND SCIENTIFIC PRESS

Whole No. 2207.—VOLUME LXXXV.
Number 19.

SAN FRANCISCO, CAL., SATURDAY, NOVEMBER 8, 1902.

THREE DOLLARS PER ANNUM.
Single Copies, Ten Cents.



Construction Trains Hauling Rock From Little Round Mt. for the Great Dyke Across the Lake.



Steam Shovel at Work on the Cut-Off at Foot of Little Round Mountain, Camp Harney.



M. Harney Superintending Construction Work in Lake Between East Shore and Promontory.



Building the Road Across the Lake, Midway Between East Shore and Promontory.



Constructing Track for Rock Train by Means of Sand Piers on Which Heavy Stringers and Track Are Laid.



West End of Construction Work Between East Shore and Promontory, Aug. 30, 1902.

Scenes on Construction Line of Ogden-Lucin Cut-Off, S. P. R. R., Across Salt Lake, Utah. (See Page 266.)

MINING AND SCIENTIFIC PRESS.

ESTABLISHED 1860.

Published Every Saturday at 330 Market St., San Francisco, Cal.

TELEPHONE, DAVIS 771.

ANNUAL SUBSCRIPTION:

United States, Mexico and Canada.....\$1.00
All Other Countries in the Postal Union.....5.00

Entered at the San Francisco Postoffice as second-class mail matter.

Chicago Office (Telephone, Harrison 73)737 Monadnock Block.
Denver Office (Telephone, Olive 733).....606 Mack Block.

J. F. HALLORAN.....Publisher.

San Francisco, November 8, 1902.

TABLE OF CONTENTS.

ILLUSTRATIONS.—Construction Trains Hauling Rock From Little Round Mt. for the Great Dyke Across the Lake; Steam Shovel at Work on the Cut-off at Foot of Little Round Mountain, Camp Harney; M. Harney Superintending Construction Work in Lake Between East Shore and Promontory; Building the Road Across the Lake, Midway Between East Shore and Promontory; Constructing Track for Rock Train by Means of Sand Piers on Which Heavy Stringers and Track Are Laid; West End of Construction Work Between East Shore and Promontory, Aug. 30, 1902, 262. The Trestle Bridge Being Built Across Salt Lake by Which the S. P. R. R. Will Save 42½ Miles Distance, 266. N. W. S. & R. Co.'s Plant, Looking South; N. W. S. & R. Co.'s Plant, Front View; N. W. S. & R. Co.'s Plant, From the Sea, Crofton, Vancouver's Island, B. C., 270. Mining and Metallurgical Patents, 271.

EDITORIAL.—Colorado at the St. Louis Exposition; The Lead Merger; The Control of the Silver Market; The Proposed Blue Mountain Forest Reserve; "Financial and Physical Condition" of Utah Mines; "Wildcat" Mine Investments; "Questions and Answers;" Cripple Creek, Colo., Combine; Mining Congress at South Dakota, 263.

MINING SUMMARY.—272-273-274-275.

LATEST MARKET REPORTS.—17.

MISCELLANEOUS.—Concentrates, 264. Some Further Questions and Answers, 265. Ogden and Lucin Railroad Cut-Off, 266. Notes on Sump Solution, Extractor-Box Work and Cleaning Up in the Cyanide Process, 267. Width of Sluice Plates; Value of Fuel Oil; The Finer Issue of Mining, 268. Mine Valuation by Mining Experts; Electric Power in Rhodesian Mines; Electric Three-Phase Plant for Pumping; Laoustrine Deposit of Gold, 269. Smelting on Vancouver Island, B. C.; Death From 110 Volts, Alternating, 270. Two Suggestions; Mining and Metallurgical Patents, 271. Personal; Commercial Paragraphs; Catalogues Received, 275. New Patents, 17.

COLORADO will have a space 200 feet square in the mineral exhibit building at the St. Louis Exposition, and will doubtless derive great benefit from the acre of space properly utilized. That event will afford excellent opportunity for good advertising of mineral resources, and every prominent mining commonwealth should see to it that good space is secured and good use made of it. This is an age of advertising, and the State or section that neglects its legitimate opportunities falls behind in development.

THE lead merger is the latest in mine product monopolies. The details of the combine are now being worked out; the policy is of course the same general one that controls and guides similar aggregations, it being doubtless the plan of the lead companies' consolidation to put into practice full recognition of the fact that even absolute control of production gives no power to advance prices except by restricting the supply. Arbitrary prices diminish consumption, and where profit depends upon the elasticity of the demand, the surest way to maintain a profitable sale figure is to check increase in the quantity available. All the big "trusts" have learned this lesson, and as the new merger is a child of experienced parents, it will doubtless be an apt pupil.

ON page 265, among an overflow from "Concentrates" page, are some questions and answers. As is customary with this paper many of the questions (as on pages 228 and 229 of the issue of Oct. 18) are answered by experts on those subjects, to whom the questions are submitted with courteous request for reply. The matter is here noted in reference to the question from Cedar, Arizona, relative to drilling. The practical miner to whom this particular question was referred was Mr. Henry W. Stow, manager Gold Bank mine, of Forrestown, Butte county, Cal., and his answer is printed verbatim to illustrate a point to which editorial attention has been more than once directed, viz: that very often it is not possible or practical to give some of the questions received any more than the most general answer, as the inquiry is not in detail, nor specific. In his answer Mr. Stow very aptly points this out, and asks a few questions himself, illustrative of what might be brought out concerning that subject. The matter is not referred to for any other reason than to say that clearness of thought is necessarily precedent to clearness of utterance, and in all technical work it is

absolutely essential to accuracy and thoroughness that there be a precision and detail to every bit of work, even to the asking of a question about it, especially if it be expected that such question have appropriate answer of individual value.

GRADUALLY and naturally the control of the silver market is passing from London to New York and San Francisco. The silver shipments which have long been made from San Francisco to China now extend to India, which is an inevitable business result of American domination in the Philippines and consequent direct trade influence in the Orient. The establishment of a Manila branch of the U. S. mint and U. S. banking facilities there should tend to check the freight rate system so long in continuance that made steamship charges on silver, via English ports, thirty-five days, more than direct from San Francisco, twenty days. Through shipments are now made from New York to Bombay. As to Chinese silver much of it has all along passed through Hamburg, a roundabout system, manifestly more costly and cumbersome than from San Francisco to Shanghai, via Manila. Speed and directness, with minimum freight charges, characterize all modern business, and must obtain in the placing of silver in its best market—the Orient.

UTAH mining men are discussing the advisability of presenting a bill at the coming session of the Utah State Legislature making it mandatory on all mining companies in the State to periodically issue a statement of their "financial and physical condition." The idea of such a law is an excellent one: its observance and practical working in other localities has not been wholly satisfactory. A legal measure of that nature would have to be rigidly and impartially enforced, and in that event the law would be of undoubted public benefit. The question is almost entirely one of public policy: to protect probable investors against frauds and fakirs, who find their finest fields in the lack of publicity that affords opportunity to work off worthless mining schemes on investors to the ultimate injury of the commonwealth. But a lax or corrupt administration of the law would make matters even worse than at present. Utah's skirts are clean in that regard in comparison with some other mining States, and if such a law is put on her statute books there should be as little opportunity for "graft" as possible, and sufficient continuity of public opinion to insure impartial observance.

EASTERN OREGON MINERS are remonstrating against the proposed Blue Mountain forest reserve. They take the stand that it is unnecessary; that it curtails the mineral area and subjects the prospector and miner, particularly the former, to espionage. The government officials say they have given the matter careful consideration and after extended examination they find that the limited supply of timber demands that some steps be taken to prevent the utter destruction of the forests and consequent heavy loss to ranch owners and miners on account of the scarcity of lumber that would follow reckless destruction of the forests. It is understood that the opposition does not concede the entire truth of the official statement. That there is rapid destruction of the country's forest area is manifest, and that every just effort should be made to conserve the timber goes without saying. It is for the public interest, the common good, that requisite reservation and protection should be made and maintained. In this all are concerned, and while, by reason of the facts, the prospector and miner are entitled to more than ordinary consideration, yet impartial administration of the proposed segregation of certain timber areas must work to the ultimate advantage of all residents of that region.

AN Eastern contemporary makes an excellent showing of the folly of "wildcat" mine investment, but, possibly, goes too far in general denunciation of the primary stage of a mine proposition, big or little. Just where the line shall be drawn, or just what should justly be termed a "wildcat" is at times difficult, and where there is no clearly manifest tendency to fraud or sharp practice, it is sometimes safe to give the property the benefit of the doubt. It is very easy to call a new or unproductive mining property a "wildcat," on the assumption that it can never be anything else but a sink for foolish invest-

ment; but it is not so easy to fairly or justly draw the line between what may appear to-day to be the wildest of wildcats or to-morrow so good a thing that the owners feel sorry for the outsiders who own none of it. Of course, it may be said: "This is only haggling the question. Everyone knows what a 'wildcat' is." But do they? The history of many great dividend payers shows differently. The Comstock, Cripple Creek, the Homestake, Tonopah and a dozen others furnish examples of how mistaken smart men may be as to the probabilities of a district. It were not well to be too hasty to dub a mining property a "wildcat" unless its owners or manipulators exhibit "wildcat" tendencies. These "wildcat" attributes lie more largely with men than with mines.

AMONG unions and trusts of various kinds the combine of the Cripple Creek, Colo., leasers is worthy of notice. It is reported that the organization provides that none of its members shall pay to mine owners a higher scale of royalty than 25%. There are some conditions that would appear to justify the attitude of the Cripple Creek leasers in refusing to pay a higher royalty. Indeed it should not be necessary—that is, such an organization should have no just reason for existence, as it is manifestly to the interest of the mine owner not to attempt too hard a bargain with the would-be leaser. Sometimes a mine owner gives a working bond to a prospective purchaser, the regular agreement being made that the development, etc., shall be done as it ought to be, but experience of that kind is often very unsatisfactory, as not seldom when the bond leaves, the last state of that mine is worse than the first. Not so with the leaser; he is usually a miner and works the ground miner-fashion. But if he has to pay 30% royalty on \$25 ore, he can not do the dead work and exploitation that properly go with ship-shape handling of a mining property. He has to gouge and gopher to make expenses and the result is had for both parties. However, the whole thing is simply a case of supply and demand. If there are three leasers competing for one bit of ground the owner can get whatever royalty he asks; if the reverse, then the paraphrase of "two men for one job" applies. So long as the present risk demand for leasing ground exists in Cripple Creek, it is probable that the principle embodied in "the leasers' combine" will be more of a silent precept than an active duty.

THE American Mining Congress, through its secretary at Carlisle, Penn., solicits aid and advice that the next session at Lead and Deadwood, South Dakota, may be an assured success. Among the suggestions of the secretary are the presentation to Congress of the opposition to the proposition abolishing apex and extralateral rights. Any organization that makes continuous opposition to that measure cannot be considered as thoroughly representative of the best interests of the mining industry. It is not to be wondered at that the recent "Mining Congress" in Butte voted down a proposition to do away with "the law of the apex" without discussion. Such a thing didn't need discussion—there. Montana is a marvel for mining statistics and money manipulation, and "the law of the apex" has considerable local significance, more particularly with Mr. F. A. Heinze, who ten years ago first found how splendidly "the law of the apex" could be worked. While mining engineer for the Boston & Montana Co. he is credited with having found certain unclaimed spaces between the surface lines of sundry valuable copper producing properties, got possession, announced infringement, secured injunctions, all done in accordance with law—"the law of the apex." Nor is Mr. Heinze to be arraigned therefor. All he has done has been done in strict compliance with the letter of the law. The wrong lies in the silly statute that permits such perversion of natural law. Meanwhile Secretary Mahon of the American Mining Congress appeals for aid to properly present the "protest" of the last convention of the Congress at Butte to the coming Congress at Washington. Due regard for the eternal fitness of things might impel Mr. Heinze, as a chief beneficiary, to make handsome contribution to the fund so solicited. "The law of the apex" has made millions for him: it were but doing the handsome thing for him then to aid in deferring or defeating its repeal.

Concentrates.

UNDER ordinary conditions water can hold in solution about 25% of salt.

IN a mine employing 350 men the cost of candles would be about \$3 per month per man.

THE largest surface pipe line in the world starts at Coolgardie, Australia—328 miles.

A COPPER TUBE of ordinary thickness and 1 inch internal diameter should stand heat up to 706° F.

NO ONE can "define electricity." There is a scientific theory that it is a disturbance of the ether of space.

AN aneroid barometer and a holstetric barometer are the same thing. The difference is only in the names.

AT a speed of 12 miles per hour a 1½-inch diameter steel cable should be theoretically capable of transmitting about 2000 H. P.

THE volumetric efficiency of an air compressor is the proportion of the amount of air actually delivered into the pipe line to the theoretical piston displacement of the compressor.

IT is not uncommon to use a steam shovel in tunnel work. An instance is the Aspen tunnel on the Union Pacific Railway in Wyoming last year, where a steam shovel did notable work.

NO IRON or steel ship has ever been built in Canada, the plates, angles, beams, etc., of which were made in Canada, not having the facilities to convert the raw material into completed ships.

URANIUM ORE is bought by P. Spier, 1 Ernstrasse, Breslau, Silesia, and J. E. Deorient, Zwickau, Saxony, Germany. So far as "Concentrates" knows there are no direct American buyers of uranium ore.

AN INK which can be used with a drawing pen on zinc and which is acid proof, is made of one drachm verdigris, one drachm sal-ammonia powder and one-half drachm lamp black, mixed with ten drachms water.

WITHERITE (carbonate of barium) is worth about \$25 to \$30 per ton delivered in New York, in the lump. Powdered it is worth about 2 cents per pound. Barium oxide is a manufactured article at Niagara Falls, N. Y.

A WOMAN married or single, or a male minor can locate and hold a mining claim. A placer location can be any shape, but must conform as nearly as practicable with the U. S. system of public surveys and the subdivisions of such surveys.

WHIN is the Scotch name for quartzite. Quartzite is merely a sandstone in which the crystals have disappeared by becoming indurated. Sometimes when the original sand beach contains gold the quartzite will carry a little gold.

PNEUMATIC DRILLS range in weight from fourteen to thirty-five pounds, and drill from ¼ to 2 inches with from 3 to 4 inches feed, and require pressures from 80 to 100 pounds, with a consumption from 20 to 45 cubic feet of free air per minute.

LEAD is treated by the electrolytic process at Niagara Falls, N. Y., 1000 pounds spongy lead yielding 108 pounds litharge, 110 pounds red lead, 116 pounds lead peroxide, or 125 pounds white lead. Sulphuric acid is produced as a by-product, about 800 pounds to each ton of lead.

IMPULSE WATER WHEELS large enough to develop 3700 H. P. each, using water under a head of 1600 feet, have been built in San Francisco. Two of that size were furnished an electric power company to be direct-connected to a 2000 K. W. alternator, mounted on nickel steel shafts.

AT Manton, near Red Bluff, Cal., water power is applied direct to a circular saw in the sawmill of Forward Bros. Two 20-inch water wheels under a fall of 120 feet are attached to the end of a 20-foot steel shaft 4½ inches in diameter. The 60-inch saw is at the other end of the shaft and works satisfactorily.

DIRTY MERCURY can be cleaned by digesting it with dilute nitric acid for twenty-four hours, taking one part acid to three of water. In retorting foul quicksilver to purify it, the retort should be half filled, the quicksilver covered with a layer of quicklime or powdered charcoal, the heating then done very gradually, the retort not being brought to a full red heat.

WOOD may be used with success as fuel for a reverberatory furnace. At San Fernando, Mexico, it has been so used with marked success, the furnaces being 9x16 feet; grate area, 16½ square feet; depth from bridge to grate, 3 feet. With four Mexican cords—equal to 7.7 American cords—fifteen tons of calcined concentrates and siliceous ores were daily smelted, making a slag of about 40% SiO₂.

WHERE a good priming pump is installed with tight piping and a vacuum of 27 to 28 inches is liable to be formed, it is safer to have the priming pipe carried up more than 30 feet above the water level, as there will be some surging of water in the pipe. Thus some water might get over into the horizontal pipe and from there into the primer, and a very small quantity of sand or grit will impair the efficiency of the latter.

WHEN an ore deposit occurs in a massive rock like granite, porphyry of any kind, feldsite, andesite, etc., and there is found an extensive crushing of the country rock along and including the vein, crosscuts are of utmost importance, for the best defined wall often proves to be merely a plane of fracture within the mineralized

zone, beyond which pay ore may be again found; and because a crosscut in one portion of the mine is without result, should not deter the management from making others elsewhere.

THERE are three standpoints from which the relation of a geological survey to the mining industry of the country may be viewed: The purely scientific or geological point, the technical point and the commercial point. As from the nature of things the third point often demands only the consideration of a very small portion of a particular district, it is not to be the business of the Government to consider such a view point.

CONCENTRATION of cinnabar ore is not considered profitable or economical. Usually it would cost more than direct treatment of the ore as it comes from the mine. If there were a very large body of low-grade ore capable of being quarried and treated by free water power in a place where fuel was expensive, concentration might be admirable, but ordinarily it is not thought that in the case of cinnabar ore it would be of any benefit.

THE MINING AND SCIENTIFIC PRESS is always glad to receive and publish communications of interest to miners and metallurgists and industrial workers. Interchange of opinion and experience is of general value to the mining industry, and mining men everywhere are invited to consider the columns of the paper an open forum for discussion and information upon topics of practical value. Photos for illustration often enhance the value of such suggested articles.

TO ASSAY a quicksilver ore containing arsenic, the ore may be mixed with 4½ times its weight of litharge; heating this in a retort produces a flowing, slag-like mass, formed by the litharge, sulphuretted of arsenic, etc., the cinnabar being decomposed into sulphurous acid and metallic mercury. The quicksilver is completely volatilized by a moderate heat and collects in the condensing apparatus and the farther portion of the neck of the retort. A precaution necessary during the operation is to gradually and moderately heat the clay or glass retort, to prevent its being perforated by the effects of the litharge before the process is finished.

EVERYTHING in the reading columns of this paper is intended to so appear solely for its value to the reader. The subscriber is foremost, and what is of interest to him is what is always desired. If any article or item happens to advertise any one making the device or apparatus mentioned, so much the better for him, but such notice is incidental. The paper is in its forty-third year, and has never yet taken a dollar to put anything in its reading columns—or to keep anything out. The fact that a published description of some work may prove an advertisement for whoever made the machinery is no reason why it should appear, but certainly is no reason why it should not if the matter is of sufficient interest to readers to warrant its appearance.

A CATALYTIC AGENT is a material which affects the velocity of a chemical reaction without itself appearing in the final product. A catalytic substance is incapable of starting a reaction; it can only affect the rate of change. The number and variety of reactions susceptible to catalytic influence are almost infinite. There appears to be no kind of chemical reaction which cannot be influenced catalytically, and no form of chemical substance, be it elemental or compound, which cannot act as a catalyst. The catalytic agent may be a gas or a vapor, a liquid or a solid. The reactions effected may be of simple combination or dissociation; reduction; oxidation, which may be partial, complete or fractional; hydrolysis; substitution, etc., together with combinations of these.

A POCKET in quartz is gold concentrated in a quartz ledge, occupying a few inches or a few feet lengthwise of the ledge, and the shoot may run down lengthwise many feet. Beyond a few inches or a few feet lengthwise of the ledge the rest of the ledge may not contain a color of gold, or it may pocket in other places, as it often does. Pockets are generally found near the top of the bedrock, though many have been found 50 or 100 feet, and even deeper. A pocket may contain a few dollars or many thousands, this being generally governed by the size of the ledge and the amount of iron in and around the ledge, caused by an iron stringer striking the ledge where the pocket is found. Without the presence of iron there can not be a pocket, though iron in a quartz ledge is no evidence of a pocket of gold. Pockets may occur in any formation—slate, granite, serpentine, porphyry, etc.—but not where the upper or hanging and lower or foot wall of the ledge are of the same formation. There must be contact to make a pocket.

THE constant of a riveted, uncoated metallic flume is 142.42, of an ordinary wooden flume 76.7; then, $142.42 \div 76.7 = 1.844$; velocity or discharge for such wooden flume multiplied by 1.844 gives the velocity of discharge of a metallic flume, uncoated, if the flumes are of equal dimensions and grades. The positive coefficient of asphaltum-coated flumes is 158.10; $158.10 \div 76.7 = 2.061$; so the velocity or discharge of a coated flume of equal dimensions and grade with a given wooden flume would be 2.061 times greater than that of the wooden flume. As between a coated and uncoated metallic flume, the coated flume will generate a velocity of 1.118 times the uncoated flume, both being equal in size, shape and grade. Therefore, the metallic flume will not require as steep a grade nor as great an area for the same carrying capacity as a wooden flume. Its great durability, in connection with this fact, suggests that it would in Arizona be the more

economical of the two. Where lumber is of poor quality and high in price, and steel or iron is cheap, small sheet iron or steel flumes may be economically made semi-circular in cross-section, and thus enclose the greatest area with the smallest possible quantity of metal or metal perimeter.

IT is not uncommon to have a manufacturer expressly warrant or guarantee an article to be of a certain grade or quality or specially adapted and intended for a specific use. Concerning the liability of a manufacturer upon goods which he has not expressly warranted in writing or otherwise, there is a presumption that because of the character of the article the warranty was implied. A general rule can be stated that when an article is ordered to be manufactured for a particular use or purpose there is an implied warranty that it is to be reasonably fit for such purpose. But when the article ordered was to be of a peculiar design or description, when defined and understood between the parties and the article was made in pursuance of the specifications, then no warranty is implied further than that it should be of good workmanship and material and should be well put together. Where a maker delivers an article just as it was ordered, without regard to its use, he can not be held to have implied anything beyond the skillful making of the article. But there are cases where manufacturers make an article which they advertise to be for a specific purpose. In that case there is an implied guaranty that under proper conditions it will do what is claimed for it.

MINERS are sometimes apt to decry promoters as middlemen who get the largest profit and who hurt the mining industry. But as there is a difference between a prospector and a miner, so is there a difference between a miner and a promoter. The prospector finds the claim, the miner works it and the promoter sells it to men who equip it with machinery and give employment to miners. Mining camps which attract good and honest promoters are apt to come to the front much faster than those without them. The promoter hunts up the mine, finds out the facts about it, gets his reports and maps, and then goes to the centers of capital to get the proper men to take hold of it. The miner himself does not know how to do this part of the business, and it takes a great deal harder work to find men to buy mines than it does to find mines to sell. The promoter has his place in the mining industry and serves a useful purpose by getting the miner money for his claim. There are hundreds of miners all over the country having claims for sale, but few of them know how to go about it. Those who come to the cities seldom sell their claims except through the intervention of third parties who bring seller and buyer together. Only those who have tried it know how hard it is to bring to a successful conclusion the sale of a mine at a high figure. It takes hard work and a certain amount of business knowledge which the miner sometimes lacks. A few good enterprising promoters can drive away hard times from a mining camp, by bringing in the necessary capital to develop the mines, put up mills or smelters, build roads and otherwise inaugurate an era of prosperity.

THE mining code of Mexico differs materially from that of the United States. In our sister republic any person, foreign or citizen, can locate as many claims or "pertenencias" as he feels able to handle, each claim being 100 meters square; provided, however, that no foreigner can locate mines within the free zone—for a distance of 52 miles from the boundary line—without obtaining special permission from the government of Mexico. Having made his locations, he presents a petition to the mining agent of the district in which they are situated, asking that they be adjudged to him in accordance with the law. The fees for registry, publication, stamps, etc., should not exceed \$12 (Mexican), but are generally about thrice this amount, the official schedule being adjusted to suit the climate. If the petition is admitted, as it usually is, upon payment of the fees it is regularly filed for registry, and within three days thereafter an order for survey is issued. Theoretically, any competent engineer can be selected to make the survey, but as the question of competency may cause complications it is better to accept the party recommended by the district agent. When the survey is returned the agent makes an extract from the registry and causes it to be published in the official paper of the State, citing adverse claimants to appear and show cause, as in the case of the U. S. patents. At the end of four months it is the duty of the agent to forward to the federal department of public works a transcript of all the proceedings, and if these are found to be regular, and the stamp duty of \$10 is forthcoming, a title is issued. The cost of surveying is generally \$15 for each claim, when there are many, the minimum cost of survey being \$100, but this expense is affected by distance and other variable conditions. The only limitations to the absolute ownership of the mines is an obligation to pay an annual tax to the federal government of \$10 per annum on each claim, payable every four months. If this is not paid promptly a maximum extension of three months is granted on payment of fines of 25%, 50% and 100% additional for each month, respectively, and a complete failure to pay is held to be an abandonment of the property, which then reverts to the public domain. The State government collects a maximum tax of 2% on the gross product of the mines (which can be avoided by letting them lie idle) and \$6 per \$1000 on the assessed value of improvements. The assessment is made by an official expert appointed for each district.

Some Further Questions and Answers.

In the issue of October 18 appeared two pages of questions and answers in addition to the usual page of "Concentrates." Further overflow necessitates the use of a little more extra space this week. On the "Concentrates" page the questions themselves are omitted, and the answers concentrated to the briefest possible space. If all the questions asked and their answers were each week printed in full, there would be little room for anything else. Hence the necessity for compression.

Could you inform us who purchases manganese? We have a mine of it. What are the principal uses for the metal?

Sacramento, Cal.

The Illinois Steel Co. are among the most prominent buyers. They determine the price of manganese ore on a schedule based on ores containing not more than 8% SiO₂ and 0.1% P. Ores delivered at their works, South Chicago, Ill., are settled for on a basis of analysis of samples dried at 212° F., the percentage of moisture in the samples as taken being deducted from the weight.

California produced about 600 tons of manganese ore last year. The total 1901 United States production was 638,795 tons, worth \$1,644,117. There were imported during 1901 256,252 tons, valued at \$2,042,361.

It is in usual demand in this west half of America for flux in smelting silver-lead ores; in steel manufacture east of the Rockies, imparting a hardness and toughness. The commercial value of the Sacramento deposit would be governed largely by possible local demand.

Here is a question I wish you would answer: A had a quartz mill. It was nearly destroyed by fire. In due time the county assessor assessed it (the wreck). A did not pay the taxes. The county bought it in and let it lie on the ground twelve years. The ground was open for location. B came along and located a mining claim, taking in the wreck in his location. Can the county claim any right to the old machinery, and did it belong to B? Can they still hold it for the taxes?

Yerington, Nev.

This would afford a fine chance for a lawsuit. In law any "improvements" upon public lands of the United States pass to the purchaser from the Government. In the case of Meyerdorf vs. Frohner, 3 Mont., 282, 320, it was held that the relocater of a mining claim holds his estate by purchase. It has been held that a hoisting works, pump, or mill annexed to the soil for mining, become part of the freehold. "Lindley on Mines" says: "As such, they will pass to the relocater."

The Lyon county, Nev., assessor could probably be prevailed upon to waive any rights to partially burned mill appliances that have been lying exposed to Nevada weather for twelve years, though if the county had sold the property for "delinquent taxes," the buyer might be in evidence if the relocater ever made the claim valuable by development work. Then there is the problem of what right any State or county has to assess unpatented mining claims. Our advice would be to dump the old ruins off on adjoining ground, and thus solve the problem. They can not be of much practical good. If a mill is needed, an up-to-date one would be cheaper.

What advance per day would you consider good in sinking an incline shaft (45° pitch), 6x8, medium hard rock, but breaks well, two shifts of eight hours each, two men per shift, hand drilling, shaft 140 feet deep, the miners doing all timbering, track laying, lowering pump, etc.—taking up probably one-fourth of their time—shaft making about 500 gallons water per twenty-four hours, hoisting being done with a gasoline engine and self-dumping skip?

Cedar, Ariz.

[The above question was referred to Mr. H. P. Stow of Butte county, Cal., for reply. Mr. Stow's answer is published verbatim, to illustrate that an answer of fullest value would require more definite detail of information on which to base accurate answer.]

Yours at hand enclosing the inquiry about sinking a shaft. It is impossible to give anything like a definite answer on the data furnished, but I should say about 25 feet a month, working every other Sunday, would be a good average. If it is of sufficient interest to your inquirer to answer the following questions, I should be glad to give another opinion:

What is the kind of rock the shaft is being sunk in?

Are both (or either) walls in the shaft, how far apart, and does either wall carry a gouge?

Are your dimensions given—6'x8'—inside or outside dimensions, what is the size of the timbers used, and how far apart in the shaft?

Why do you use a pump with only 500 gallons of water in twenty-four hours, and what kind of a pump is used?

What is your present average per month?

Do you drill single or double handed?

How many holes a shift do you put in and how often do you blast?

What kind of powder do you use, and strength?

What is the capacity of the skip, and how many skips do you hoist in twenty-four hours?

In only working two shifts, why do you work eight instead of ten-hour shifts?

If ——— can think of any other information, it would be well to state it. It is difficult for a man unfamiliar with a district to give a close estimate on work, unless he has all the data possible, and what might be considered medium hard rock in one district would be considered quite different in another. The kind of formation and character of the rock will go a long ways towards telling how hard it is.

When I drilled here by single hand, if a miner averaged 6 feet a day of ten hours in quartz he was doing good work. The quartz was unusually hard and tough and wore the gauge off the drills very rapidly. In sinking my shaft here, using a 2½" air drill, working two men to a shift, three shifts of eight hours, shaft 5'x7', some of the ground timbered and some not, one wall with a gouge, probably about 250 gallons of water per hour, we averaged 60 feet a month. The miners did all the work, except hoisting, that being done by a compressed air hoist. Shaft about 40° pitch. The rock was greenstone of the hardest kind and required from six to fourteen holes to the round, and averaged about one round in twenty-four hours. A soft seam about 2 feet thick crossed the shaft diagonally part of the way, making the drilling easier and quicker, but requiring timbering, so the advance was about the same.

H. P. Stow.

Forbestown, Cal.

What kind of iron does magnetite or black sand make? Is there any method of converting it into pig iron?

Sacramento, Cal.

A process of thus manufacturing iron has been devised by F. C. Cream of Montreal, Canada, who has a patent on it. He professes ability to utilize loose granular magnetite, or what is known as "black sand," for the manufacture of cast iron, steel, nickel steel, and any alloy including iron the component parts of which have an affinity for iron. An ordinary foundry ladle or crucible is charged with the molten metal, mixed with the black sand, which has first been cleaned of silica, titanium and other foreign substance, the proportion of cleansed sand varying according to the grade of hardness required in the product. As an example, the specific method may be described of producing an iron having a breaking strength of 78,400 pounds in bars of 12 inches length and 2.99 inches by 2.93 inches cross-section. In the production of these bars a foundry ladle is charged with molten pig iron, 66%, to which is added, immediately the pig iron is poured from the furnace, 34% of clean loose granular magnetite or black sand at its natural temperature. This mixture is stirred a few times and the iron is complete. A test of this iron and of iron with different proportions of pig iron and magnetite in bars of different dimensions give the following results:

Composition.		Length. Inches.	Bars. Cross section. Inches.	Breaking Strength. Pounds.
Molten Pig Iron—%.	Magne- tite. %			
84	16	12	3.02x2.98	68,000
80	20	12	3.01x2.98	73,800
76	24	12	3.00x2.98	75,600
66	34	12	2.99x2.93	78,400

The inventor found a difficulty in treating large quantities and in alloying the iron particles of loose granular magnetite and a metal having an affinity for iron, in causing the molten metal and loose granular magnetite to mingle. The molten metal, if the magnetite were placed in the crucible first, would run over the top of and combine with only a small proportion of the magnetite, and the same would be the case if the molten metal were first poured into the crucible and the loose magnetite poured on top of it. To obviate this difficulty and cause the molten metal and loose granular magnetite to mingle thoroughly and combine with one another, a predetermined quantity of the loose granular magnetite is supplied through a tube to a predetermined quantity of the molten metal in the crucible, the tube being gradually raised from the bottom through the mass of metal in the crucible while the magnetite is being fed through, thereby causing the magnetite to be thoroughly distributed throughout the metal in the crucible, or, if desired, the molten metal can in a similar manner be fed through the tube into and distributed through a body of loose magnetite in the crucible.

We have a ledge of soft substance varying from 3 to 5 feet wide running down against a ledge of quartz. The quartz lies on the foot wall side. We have not struck the foot wall yet, but have a well-defined hanging wall of porphyry. This soft ledge matter is full of black mica and will prospect in fine gold from \$4 to \$10 per ton. It resembles soapstone, has an oily feeling, with no grit only where there are little stringers of quartz in it. In color it is from a light chocolate to almost black. It is a new substance for gold here to the miners. We have a shaft down 14 feet on it now 5x7 feet. This ledge is on a creek that has been worked continually since 1852, with a great deal of coarse gold taken out.

Callahans, Cal.

This is another puzzler, because of only partial

presentation of the facts. Even assuming the description is correct there isn't enough told nor is it told in a detailed way. It is probable our inquirer has run against a dyke that has become kaolinized. He might send a sample of the stuff to Mr. E. B. Preston, California State Mining Bureau, San Francisco, Cal., not for assay, for the Mining Bureau doesn't do that kind of thing, but for qualitative analysis. To attempt determination of minerals from mere outlined description is a difficult task.

Will you kindly give in "Concentrates" the use of zinc acetate in assaying?

Portland, Or.

There is nothing in assaying which requires the use of acetate of zinc. But acetate of soda is often used in making humid silver assays when there is mercury present in the silver, the acetate of soda being added to the solution of silver nitrate before adding the salt solution, this prevents the precipitation of any mercury.

Will you kindly explain in "Concentrates" why tungsten sells as high as it does? What are the methods of reduction from its ores? I have heard that in reducing it they have difficulty in getting rid of the iron and make a very uncertain product. Is this so? Would a method which reduces a pure article at a normal price be an improvement on the present methods of reduction?

Somerville, N. J.

Tungsten is not considered as selling at a "high" price, when the situation is viewed. There is a very limited amount used, and, as in all such cases, overproduction is easy. The present price of the ore is considered to be low, being about half what it was two years ago. Ore carrying less than 40% tungstic acid is not ordinarily deemed available: averaging from 45% to 55%, it will bring about \$2 per unit; ores running from 65% to 75%, from \$2.50 to \$3 per unit, if free from phosphorus and sulphur. It requires considerable chemical and metallurgical skill to deal with the ores successfully. Considerable wolframite is sent from Spain to Germany. There are also works at Battersea, London. The ore is first crushed in ball mills, and is then roasted in presence of soda, with the object of producing tungstate of sodium. This substance is leached out, and then, by the addition of an acid, the tungstic acid is liberated from the soda and separated out by a filter press. The final operation is conducted in crucibles, as a very high temperature is required. The tungstic acid, mixed with charcoal, is charged into these crucibles, which are placed in a furnace of the same type as that used for steel making. Here the oxide is reduced and gradually recedes to the bottom of the crucible, where it is found in a fritted mass. The series of operations sounds simple; but it is difficult to carry out successfully, as a very slight change of temperature upsets the reactions. The Great Western Exploration & Reduction Co. of Boulder, Colo., is reported to be experimenting along the lines suggested in the last question from our New Jersey correspondent.

Several times I note reference to cyaniding gold ore without crushing or pulverizing. Is it feasible, and where could I have particulars of the process?

Mercur, Utah.

It is not at all uncommon to treat gold ore by cyanide without fine pulverization. In the process of M. Baxeres de Alzugaray for the extraction of gold and silver the ores are crushed in the ordinary way, but without being pulverized, and are soaked in a solution of cyanide until the mass can be moulded with the hand. In general, the proportion of the liquid employed may be about 5% of the weight of the ore to be treated. The ores are afterwards passed to the sifter in a receptacle which can be hermetically sealed, and a gaseous mixture of bromine and oxygen in varying proportions is conveyed slowly through the mass from top to bottom. The gaseous mixture, traversing the crushed ores, acts on the metals and forms soluble salts. The excess of the gaseous mixture goes to a condenser. After this treatment the mass of ore is washed with warm or cold water, which separates the soluble salts of the metal and leaves them in a state of solution. From these solutions the previous metals are obtained by precipitation with zinc or some other metal, as ordinarily, or by electrolysis. In this process, instead of the employment of cyanogen in dilute solution, a concentrated solution is preferably employed, obtained by dissolving about 450 grams of cyanide in about 4½ kilos of water.

For the latest reported successful cyanide practice on ore direct from the grizzly the Mercur inquirer is cited to operations at the Cummings mine, Callahan postoffice, Siskiyou county, Cal. At that cyanide plant so much difficulty had been found by fine grinding and subsequent slimes, making leaching hardly profitable, that Superintendent Jas. McKeen and F. Lundstrom, in charge of the cyanide plant, concluded to experiment with coarse material.

(It is to be noted in connection therewith that the gold values were contained in an oxidized pyrite, and that the ore in breaking in the mine, as well as in the breaker, always broke where the structure of the ore had been weakened by the intrusion of a pyrite.)

The results of the first tests showed that 80% of the value of the ore could be extracted from the

material directly from the rock breaker—that is, all material that passed through a grizzly with bars set 1 inch apart on an incline of 45°. This material was in no case larger than 1 inch pieces. The greater part of the material, however, was broken to about ½ inch or finer; the consumption of cyanide in the treatment was ½ pound per ton of ore; the time of treatment seventy-two to ninety hours.

As in many other cases, it is to be noted, also, that this was only admissible because of the values being contained in the oxidized pyrite. Doubtless with depth resulting sulphurets would require finer crushing.

All the papers here say that gold nugget recently found by a Chinaman at Salmon creek, worth \$15,000, is the largest ever found in the United States. Is that so? I think bigger ones have been found in California.

Baker City, Or.

Several of them. The tale has often been told. There is a column on that subject in the issue of July 12, 1902. The largest mass of gold ever found in California was dug out at Carson hill, Calaveras county, in 1854, and is said to have weighed 195 pounds.

In a recent issue you mention "carnotite." What is it, and where is it found?
Salt Lake City, Utah.

It is a mineral, found near Georgetown, Colo., and also at La Salle creek, near Paradox, Montrose county, Colo. The specimens found at the latter place carry 47% uranium oxide and about 16% vanadium oxide. It is also reported found in the La Salle mountains, southeastern Utah, in the same general locality as that mentioned at Paradox. The two metals it carries are of increasing value in the arts, being used as alloys of steel, in the manufacture of porcelain and glass and also in the manufacture of a fine yellow pigment. More detailed information might be had by addressing the Mine & Smelter Supply Co., Denver, Colo.

Ogden and Lucin Railway Cut-Off.

Written for the MINING AND SCIENTIFIC PRESS.

For more than thirty years the Southern Pacific Railway, in its course westward from Ogden, Utah, has made use of what is known as the old Promontory route, which runs northward from Ogden to Corinne, Utah, and thence westward over Promontory divide. This old route required helper engines for all trains going east or west over the divide, and, moreover, it was a feature adding length to the main line of the road, as well as a constant extra expense. The early engineers, in their topographical work, saw but two routes to use in the construction of a railway line to California after reaching Utah. One was the present old route by way of Promontory and the other was by passing south of the Great Salt Lake and thence running westward toward Pilot Peak, converging into the present line about Lucin. The latter route was considered impracticable because of the desolate region to be traversed westward from Salt Lake City around the south end of the lake, which route would cross the most dismal part of the great American desert.

It is doubtful if those who managed the early construction of the Southern Pacific Railway thought it was possible to find a shorter route than the one taken. In those days it was not thought that it would ever be necessary, even if possible, to find a shorter route than the one then surveyed. It is quite true that as it was first constructed, with all its grades, crooks and curves, it was a vast improvement upon the hull and mule teams of the old days, which required three months to toil out the weary journey from Weher canyon to Sacramento, and when people were able to make the trip even in seven days and for less money they considered themselves very much favored by fortune.

However, as the years went on, the traveling public began to find fault with the journey from Ogden to San Francisco over the Southern Pacific Railway. It was remarked by the average traveler that the road bed was poor and the line was much longer than it should be.

With such conditions as these existing it was not surprising if those representing large capital should look over the field to see if there was not some way by which a shorter and better road might be built from Ogden to San Francisco, especially when the business to be obtained promised large returns even from a division of the business transacted by the Southern Pacific Co.

It was about the year 1889 that one Lieutenant Von Gorp, who had been in the service of the Russian government in the survey and construction of the Transsiberian Railway, and especially in the very difficult portions of its construction around and near Vladivostok, came to the United States to look over the railway situation in the interest of Dutch capitalists, with the intention of investing in new railway projects in America. In New York City he was met by certain promoters, who laid before him a scheme for the construction of another Pacific railway, to start from Ogden, Utah, leading across the lake and

touching the lower end of Promontory point, thence across the desert to Lucin, after which the route lay north of the present line of the Southern Pacific, and running near old Fort McDermott, out through Beckwith pass, down to Marysville and thence into San Francisco. A preliminary survey was made. The lake cut-off was found to be in every way practicable and the scheme of building another Pacific railway was taking tangible form when the failure of Baring Bros. of London and kindred disasters threw a cloud over all American railway schemes, in either North or South America. Lieutenant Von Gorp returned



The Trestle Bridge Being Built Across Salt Lake by Which the S. P. R. R. Will Save 42 1-2 Miles Distance.

to Europe and the undertaking was abandoned for the time being, but the writer of this article, who was associated with the proposed road, prepared an article for the Ogden Standard, then published by Hon. Frank J. Cannon, who later became United States Senator from Utah. The article was descriptive of the road as surveyed across Salt lake, and it was this portion of the article which chiefly attracted public attention, along with the fact that it promised a competing line from the East to enter San Francisco. The newspapers of the latter city copied the article, as did also the Railway Age. Most people looked upon the Lake cut-off part of the proposed work as an utter impossibility, even Salt Lake City newspapers proclaiming it the scheme of dreamers.

However, the then manager of the Southern Pacific Railway looked into the nature of the proposed cut-off, and later, finding the work of building across the Great Salt lake not only possible, but a most advisable undertaking, the work was resolved upon, finally culminating in the present construction. I will further remark here that there is but little difference in the line as it runs from Lucin to Ogden from the route marked out by Lieutenant Von Gorp. The writer of this article throws the above light upon the inception of this work, as it has been a question with many as to who may be credited with the original idea of this great undertaking.

To give a short descriptive sketch of the cut-off construction, I will state that the new line runs almost directly west from Ogden until it reaches what is known as Little Round mountain, which mountain rises near the eastern shore of the Great Salt lake at a distance of about 16 miles from Ogden. From the south end of this mountain the road deflects slightly to the northwest and thence over the waters of the lake it takes a tangent line to the eastern shore of Promontory point. Crossing the point for a distance of about 4 miles, the road again strikes the west rim of the lake and crosses about 20 miles of water, reaching the shores of the Great American desert near Strong's Knob, and thence across the desert to Lucin.

The length of the new line thus constructed from Ogden to Lucin will be 102 miles, being a tangent line across an almost dead level, against 146 miles by the former route, with the heavy grade of old Promontory pass, thus saving for all time a distance of 42 miles, with easy grades thrown in.

In crossing the lake the road bed is built by using material taken from Little Round mountain at the east shore, with which to construct a great part of the road bed through the lake. As the waters of the Bear river, entering from the north, have to be bridged, about 1200 feet of piling is being driven into the lake bottom, and for this purpose cedar piles 70 feet in length have in many instances to be driven double, one following the other, so deep is the soft clay in the channel of Bear river. Being thus crossed, a rock causeway similar to that from the east shore is carried out from the shore of the promontory, and from the west shore of the promontory the road bed is constructed for a long distance into the lake by using rock taken from the cliffs of Promontory point. Midway in the west arm of the lake piling of great length is again used and continued until reaching the rock work which extends into the water from the western shore.

In building this causeway into the lake the first steps taken were to place at intervals of about 10 feet abutments formed by sinking bags of sand and

upon these stringing heavy timbers, on which are placed cross ties, and on these again the rails. In this way the loaded rock and gravel trains go forward into the water and the loaded cars are emptied into the lake from this side track, and as the long rock dyke rises it is leveled and widened until it is about 4 feet above the water and about 20 feet in width. The track is then placed and trains carry forward material for the later work beyond. When completed, this causeway or road bed will be 75 feet wide at the bottom of the lake and will rise almost 16 feet above the level of the water, thus making it

not only a most substantial work, but leaving no danger of the stormy waves of winter interfering with railway travel. To facilitate work, a number of wooden vessels have been constructed at a shipyard midway in the lake, and are used in towing timbers and carrying supplies along the line of construction through the lake. All kinds of heavy machinery used in modern railway building are brought to bear upon this work. The undertaking of crossing the lake is a difficult one, but the engineers are equal to the task. Even as I write, after only five months of labor, the work of construction is carried from the main shore on the east side to the promontory, where the work of building the road bed for a distance of about 4 miles is being done by the Corey Bros. of Ogden, Utah.

South of the line of the new road bed on the promontory the land slopes gently to the water's edge, where a pebbly beach will permit the erection of extensive bathing resorts in the near future, without the liability of the water receding far beyond its present shore line, as has been the case at the Salt-air bathing resort on the southeast shore of the lake.

From Ogden to the east shore of the lake the road bed is constructed after the most modern methods, with steel bridges, as at the Weber river crossings, and steel cylinders with cement facing where any irrigation canal or small stream is crossed. The road over the lake will at its surface be nowhere less than 20 feet in width, 16 feet above the water, and in most places its base on the bottom of the lake will be from 50 to 75 feet in width.

From the time the water line is reached at the lake shore to the promontory, and from the west side of the promontory to the west shore of the lake, all of the work is being done by the Southern Pacific Co., under the superintendence of their own engineers. As is frequently the case in work of this kind, unforeseen difficulties arose in road bed construction. For example, at many points where prior to the commencement of work it was thought that solid ground existed to interminable depth it was found that a thick measure of mud laid under the salt crust, over which heavy planks were laid and the lumber work and rails for the temporary track carried along upon these. The waters of the lake have been made a help in the great work, as all of the heavy timbers, such as ties, piling, stringers, etc., are floated to the points where wanted. While the warm sun of the summer months was upon the waters of the lake it was not difficult to find men who would take to the work of construction in the water, in which they waded at times to their arm pits, but as the cold increases through the fall and winter it will be different, and the work of construction will necessarily be slow for a time.

The management, planning and execution of this great work are due to the ability of William Hood, chief engineer, of San Francisco, and his able assistants, Messrs. W. E. Marsh, J. H. Austin and Michael Harney. To each of them the fact that they were associated with the work of building the cut-off through Great Salt lake will serve as a monument to the personal history of each in the years to come.

In contemplating this great work, how the mind reverts to the past, when General John C. Fremont, standing on the shores of the Great Salt lake sixty years ago, viewed the wild, weird desolation of the then desert region surrounding the great lake—the locality itself the center from which in either direction 1000 miles of uninhabited wilderness extended, tenanted only by savage Indian tribes, herds of wild buffalo, millions of deer, thousands of bears and numberless coyotes, rattlesnakes and lizards, all holding sway without molestation by civilized man. At that time San Francisco was a little Mexican post, with less than 300 inhabitants, on an almost unknown shore. At that time millions of ounces of virgin placer gold rested in the silence of the foothills and in the heights of the upper Sierras of California, and the Plute or Shoshone Indian made his sagebrush fire and broiled his jackrabbit over the spot where lay all the mighty wealth of the Comstock lode, over in Washoe, Nevada. A hundred gold, silver, lead and copper districts since made famous—from Butte, Montana, to Tombstone, Arizona—and now, O heavens! the buffalo is gone, the Indian is gone, the wilderness is no more, a hundred cities thrive where only desolation reigned on the morning when General

Fremont, with his few companions, stood on the shore of the Great Salt lake, and to-day we see a great transcontinental railway line building its road across the sullen waters of the lake, that the business along the great highway of nations may be quickened and shortened. Surely we live in an age the like of which was never known before.

The views accompanying this sketch* show parts of the work in constructing the Ogden-Lucin cut-off. They were taken during the month of September and show operations along the main line east of the lake and also in the lake itself.

Ogden, Utah, Nov. 1, 1902.

From the east shore to the promontory the lake is about 8 feet deep. This stretch will be filled in with earth and rock ballast after the temporary bridge has been constructed. The deeper portion across the main arm of the lake will be bridged. The deepest water—about 30 feet—is on this stretch, which will be on a tangent. The fall from Ogden to the east shore of the lake is 101.7 feet, and the rise from Strong's Knob to Lucin is 513 feet in 58 miles. The first material at the bottom of the lake is very fine sand from 6 to 30 inches in depth; then comes a hard stratum of soda formation 12 to 18 inches in thickness; after that alternate strata of sand and blue clay.

Notes on Sump Solution, Extractor-Box Work, and Cleaning-Up, in the Cyanide Process.†

By ALFRED JAMES.

One of the problems at present agitating the minds of cyanide operators is the effect on the extraction of gold by the continued re-use of the cyanide solutions. Such solutions contain, amongst other matters, salts of zinc, iron, occasionally copper, alkalies and alkaline carbonates, ammonia, and sulphocyanides; and it is obvious that, unless these constituents are prevented from accumulating in the solutions, the solvent power on the precious metals of any added cyanide must sooner or later be impaired.

Solutions which had been in use for some months were therefore examined, and the results noted: It was found that the extractions returned were in every case less than those obtained on the same material—ores or tailings—by making up cyanide solutions of the same strength with fresh water. Thus:

Extraction With Fresh Solutions.				Extraction With Used Solutions.			
Oz.	Dwt.	Gr.		Oz.	Dwt.	Gr.	
(a)	15	13	14	15	0	12	per ton.
(b)	20	18	3	18	13	16	per ton.
(b')	21	0	17	19	0	5	per ton.
(c)	3	17	2	3	13	5	per ton.
(c')	3	18	9	3	13	5	per ton.

It may be suggested that the presence of double cyanide of zinc and potassium (K_2ZnCy_4) may have misled the operator as to the strength in cyanide of the solutions, but it will be shown that this matter has received special attention, and that the results were similar, even when equal quantities of solid cyanide of potassium were added to fresh water and to a solution of double cyanide of potassium with caustic potash present.

Experiments were carried out with the object of overcoming this loss of power in the used or "sump" solutions, and it was found that the addition of lime improved the extractions from ores and tailings containing practically only quartz and gold, but that such treatment had a deteriorating effect on ores, etc., containing sulphides. Thus:

Extraction With Sump Solution Only.				Extraction With Sump Solution Treated With Lime.			
Oz.	Dwt.	Gr.		Oz.	Dwt.	Gr.	
(a)	12	15	2	27	0	23	per ton.
(a')	13	1	8	29	9	6	per ton.
(b)	18	13	16	25	14	4	per ton.
(b')	19	0	5	25	14	7	per ton.
(c)	4	1	1	3	1	0	per ton.
(c')	3	18	9	3	0	2	per ton.

With fresh solution the extractions in this set on c and c' were 4 oz. 1 dwt. 1 gr. and 3 oz. 19 dwt. 7 gr. respectively. a and h were simple quartz ores containing free gold, and c was an ore carrying a considerable percentage of sulphides.

A number of experiments were carried out on the above lines and the above results were confirmed. Lime being thus shown to be ineffective, except with simple quartz ores, treatment of the solutions with sodium sulphide, followed by excess of a soluble lead salt, such as acetate of chloride, was tried with the following results:

Extraction With Fresh Solution.				Extraction With Sump Solution.				Extraction With "Treated" Sump Solution.			
Oz.	Dwt.	Gr.		Oz.	Dwt.	Gr.		Oz.	Dwt.	Gr.	
(c)	3	17	2	3	13	5		3	17	2	
(c')	3	18	9	3	13	5		5	19	16	

It is thus evident that the continued use of sump solutions is a cause of serious loss in actual work, and that, though a universal law cannot be laid down for the best treatment of such sump solutions, it is strongly desirable that these solutions should, from time to time, be tested, and the results obtained compared with those from freshly made-up solutions; also that the addition of lime, with time for the subsidence of any precipitate formed, is of advantage in the case

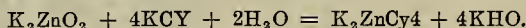
of very free and coarse gold ores; and that the treatment with sodium sulphide, care being taken to avoid an excess, followed by the addition of a small amount of lead salt in excess, is efficacious where lime fails. In this latter treatment time must also be given for any precipitated sulphides to separate out and subside.

By such treatment the necessity of running foul sump solutions to waste may be avoided, when water is scarce or the cyanide of gold contents are high.

THE EFFECT OF ZINC IN SOLUTION.—The usual practice of precipitating the gold by running the aurocyanide solutions through boxes containing zinc, causes the accumulations in the solutions of a considerable quantity of zinc salts. It has been more than once suggested that the double cyanide of zinc and potassium in the presence of caustic potash was split up into a simple cyanide plus oxide of zinc and potassium—



The author, however, discovered by means of experiments involving the crystallizing out of the products, that the above equation did not hold good, but that, on the contrary, any oxide of zinc and potassium in solution combined with the added cyanide of potassium to form the double cyanide of zinc and potassium. Thus:



This shows that the zinc oxide in solution actually takes up the cyanide added by the chemist in charge to make the solutions up to normal strength, though the silver test leaves the operator in ignorance of what has happened, and thus renders it less effective for the solution of the gold than the cyanide by itself would have been.

The following experiments illustrate this point:

Extraction With a Fresh 0.5% KCy Solution.				Extraction With Portion of Same 0.5% Solution to Which 0.25% K_2ZnO_2 was Added.			
Oz.	Dwt.	Gr.		Oz.	Dwt.	Gr.	
(a)	2	9	0	1	11	9	per ton.
(b)	16	2	3	13	6	14	per ton.
(c)	1	17	21	1	2	20	per ton.
(d)	12	18	17	7	4	0	per ton.

This is one of the drawbacks of the zinc process as compared with the electrical deposition process, which leaves the solutions in a condition of much greater energy, though the iron anodes used in the latter process are necessarily detrimental. Insoluble anodes are much needed. The accumulation of zinc in solution is, however, prevented by the action of the sulphides contained in the ore and in the cyanide, and treatment with sodium sulphide and lead salt as shown above is a good remedy for this inefficiency.

LOSSES IN CLEANING UP.—Perhaps in no other part of the process are there so many variations in the methods pursued as in that of the clean-up. At the end of the hi-monthly or monthly period the boxes are charged with slimes containing usually gold, silver, lead, zinc, iron, lime, and, in certain instances, copper; and the object in view is the conversion of these slimes into bullion with the least possible loss. To accomplish this, the treatment varies from the direct melting of the coarse zinc and slimes to separation by sieves, roasting or acid treatment, with or without filter pressing, and subsequent fusion.

To determine, if possible, the amount of loss arising from these different methods, and the best general course to be adopted, a system of very carefully conducted experiments has been carried out and the results tabulated and compared.

At first the experiments were on known weights of metallic gold and zinc in the proportions used in practice; the gold was dissolved, precipitated from its aurocyanide solution by the zinc, shaken off the zinc in the form of gold slimes, the zinc remaining was dissolved separately and the residue added to the gold slimes, which were then treated by the various methods, and the amount of bullion recovered noted together with its fineness; the deficit from the amount originally taken represented the loss in treatment. In some cases the coarse zinc was disintegrated and dissolved by the addition of alkali and cyanide, instead of acid, with the results given below.

In the final experiments, however, to gain more accurate comparative results, a large quantity of gold slimes was made, shaken off the zinc, dried, well mixed and equal quantities taken from the hulk for the various experiments; these were carried out in duplicate, no two duplicate samples, however, were weighed consecutively. In the first set the losses were found to vary from 0.5% to 6%, and, as a general rule, the less handling the slimes received the less was the loss. The heaviest losses were due to roasting, and varied with the amount of stirring or handling during the operation; the least loss from this cause was 0.23% additional to that resulting from the rest of the treatment.

In a method of roasting with niter described in the Journal of the Society of Chemical Industry the total loss amounted to 2.57%, in spite of the greatest care in heating the mixture, and in addition as little niter as would act in the manner described in the paper; probably with prac-

tice this loss would be considerably reduced, but it is still too serious a matter to be lightly considered.

Acid treatment yielded results varying with the kind of acid used, nitric acid showing a greater loss than hydrochloric and sulphuric. On the other hand, with impure zinc—that in ordinary use—nitric acid gave the purest hulkion, but with lead-free zinc dilute sulphuric acid gave both the purest bullion and the lowest acid loss.

A comparison between melting direct and a preliminary treatment with sulphuric acid gave results depending on the purity of the slimes. Where these had been passed through a forty-mesh sieve to free them from coarse zinc, melting direct gave a fairly pure hulkion and at least as good results as with acid treatment; but with scrap and coarse zinc included, the advantage lay with the latter method.

The least total loss in the first set of nineteen experiments was 0.75%, and this was obtained by treatment with sulphuric acid before melting. An experiment with lead-free zinc gave a total loss of only 0.52% with direct fusion of the sieved slimes, the coarse zinc being treated with sulphuric acid and the residue added to the slimes. Pure zinc invariably showed a smaller loss than with ordinary zinc, and very careful work on identical lines showed such gain, or lessened loss, to be 0.2%.

Treatment of the slimes with strong solutions of alkali and cyanide, with or without subsequent acid treatment, gave heavier losses.

There was, however, considerable variation in the results obtained, though the general direction of the losses was well established; and to limit such variation, as well as to still further study the effect of the use of lead-free zinc in the cleaning-up operations, the final sets of experiments were carried out, in which all the samples were taken from the same hulk of previously prepared and well-mixed gold slimes, as mentioned above, and these samples were then submitted to variations in treatment. Similar experiments were also made with the slimes from lead-free zinc prepared under identical conditions. The results were as follows, the loss for simple melting with borax being taken as x:

Melting with borax.....	x
Roasting, then melting.....	x + 0.23%
Sulphuric acid, then melting.....	x + 0.17%
Sulphuric acid, roasting, then melting.....	x + 0.40%
Nitric acid, then melting.....	x + 0.29%

In the case of pure lead-free zinc x amounted to 0.43%; in the case of ordinary zinc it was greater than this, the amount of excess exceeding the 0.2% given above.

With lead-free zinc, sulphuric acid gave the purest bullion and roasting the most hase, the roasted hulkion being more hase than that melted direct with borax. With ordinary zinc, however, nitric acid gave the purest hulkion and sulphuric acid came next; direct melting with borax yielded hulkion considerably hase than the others. The loss by acid treatment was greater than with lead-free zinc, and the loss by roasting less. It is suggested that the presence in the slimes of lead, which is converted during the roasting to fluid lead oxide, may account for the lessened loss in roasting with the ordinary zinc.

These last results confirm those from former experiments, and show that with ordinary zinc, as well as with lead-free zinc, direct melting with borax gives the great loss, and that the safest method of purifying the bullion is by sulphuric acid treatment; that the use of lead-free zinc with a sieving arrangement renders any special method of purification unnecessary and diminishes the treatment loss. All the experiments agree in showing that roasting is the cause of more or less heavy loss, and, though effective with ordinary zinc in raising the grade of the hulkion, is less efficient than acid treatment for this purpose. It is therefore suggested that, in cleaning up, means should be employed to avoid handling and to limit the number of vessels used, and that roasting should be absolutely avoided. The following description of a plant has been prepared on these lines:

Zinc boxes (extractors) should have steel side launders for discharging the slimes direct through a forty-mesh sieve into small steel vessels with perforated bottoms, over which a filter cloth is placed. These steel vessels fit into small vats, one for each vessel, and are arranged so that the overflow of slimes passes into a large vat of sufficient capacity, from which the lighter slimes which have passed out of the small steel vessels in the overflow may be collected by the aid of a filter connected to a vacuum receiver, to which all the filters are connected. The slimes may thus be collected and sent to the drying and mixing plate immediately after cleaning up, the one vessel having sufficed for the whole operation; but if acid treatment is used, the steel vessel with its contained cake of slimes is taken to the acid vat and emptied into it. The acid vat may be of wood, lead-lined, or of steel coated with special protective varnish, or of aluminum, which answers perfectly and is clean and is not attacked by sulphuric or even nitric acid. The dissolved slimes are washed with hot water and filter-pressed, or preferably run into a detachable steel-lined filter vat with a vacuum connection, washed, vacuum dried, mixed with fluxes and melted. The author prefers a vacuum vat in place of a filter press as being cleaner, easier to handle and leaving the slimes in one mass without the

* See Page 262.

† From a paper read before the Institution of Mining and Metallurgical Engineers.

inconvenience and loss attendant upon the use of the many connections, plates and filter cloths (all impregnated with gold slimes) necessary to a filter press.

PURITY OF GOLD BULLION.—The fine, amounting to from 3d to 1s 9d per ounce of fine gold, imposed by the London refiners upon base bullion containing lead, has caused much attention to be paid to the question of the advisability of returning bullion so pure as to avoid these heavy charges. An investigation has also been made into this matter, and a suggested remedy is to replace the zinc ordinarily used for precipitation by a special brand of lead-free zinc.

In the early days of the cyanide process the investors feared that lead-free zinc would not be sufficiently energetic to precipitate effectively the gold present in very dilute solutions; but in recent experiments with some lead-free zinc, which contained a minute amount of iron, it was found in every instance that, whether with strong or with exceedingly dilute solutions, a better extraction was obtained with this zinc than with that ordinarily in use, with the single exception of a fortnight's run, in which the results were equally good.

The importance of this result will be understood when one recognizes that the adoption of the lead-free zinc will give a purer bullion, and thus avoid the refiners' charges of, on an average, 9d per ounce and will lessen the amount of slimes to be treated and the loss during cleanup of 0.2%, as shown above. Against this is the greater price of the lead-free zinc; but as it takes with low-grade tailings an average amount of one pound of zinc to produce one ounce of gold, it is easy to calculate that, even if lead-free zinc were 11d per pound dearer than the ordinary zinc, it would still be preferable and cheaper to use the former brand; but, as a matter of fact, the difference in price is very much less than this sum.

In conclusion, it is suggested that increased extractions may almost universally be obtained by the proper treatment of sump solutions, or, where water is plentiful, by the making up of fresh solutions from time to time, the old solutions being got rid of as water washes after an intermediate period as weak solutions; and that much of the usual "mysterious" discrepancy between theoretical or assay results and the amount of bullion actually returned is due to losses in cleaning up, and that these losses may be lessened by avoiding roasting and unnecessary handling, and by adopting the precautions detailed above.

The gain to the Witwatersrand Gold Fields from the treatment of sump solutions should be an additional extraction of 5%, or, say, £200,000 per annum, while the avoidable loss in cleaning up is estimated to vary from 0.5% to 2% of the cyanide output from each particular plant.

Width of Sluice Plates.

TO THE EDITOR:—In the article entitled "Stamp Mill Construction," in the issue of Oct. 4, by J. J. Deming, there is one statement which I think is open to discussion, a statement frequently made by other writers on amalgamation.

Theoretically, and by logical deduction, they are correct, but practically in error, and as they must be borne out in actual practice, it is necessary to change it to fit a particular case.

Theoretically, gravity exerts a greater influence on metallic constituents than on the matrix of an ore, giving the present general method of ore concentration, except where the buoyancy of the metallic contents overcomes this gravity; but the new method of using crude oil raises the valuable portions to the top, and, stranger yet, this same oil will not absorb the siliceous and other non-metallic particles.

On the same principle, theoretically, the sluice plates, when used at all, should be of the same width as the apron plates, as stated by Mr. Deming, but in practice a width greater than 24 inches and, better, 20 inches, is more of a detriment than a benefit, and it is preferable to abstain entirely from using a greater length of full width plates than 8 feet, leaving out sluice plates, unless of the smaller width stated above.

I think it has been conclusively proved everywhere that clear water in the quantity passing through a 5-stamp battery, when crushing ore, will carry off both quicksilver and amalgam if allowed to run over the full width plates for any length of time, and when a battery is hung up this water is reduced to just enough to keep the plates wet.

It has also been proved that the friction of harren sand crushed in the mortar will very rapidly denude a plate and that there is required a constant addition of fresh quicksilver and gold in the ore to enable the amalgam previously caught to be retained on the plates. I am, of course, speaking of conditions where proper amalgamation is practiced, the plates neither too dry nor too wet, with the proper pitch, so that the practical total of amalgam is caught within a foot of the lip of the mortar. Some men, with plates 100 feet long, have the unhappy faculty of collecting all the amalgam in the last foot or two, but it is not for them I am writing.

Under correct amalgamation, therefore, the pulp

and water carry a mere modicum of amalgam and quicksilver by the time the lower end of the apron plate is reached and the friction of harren sand over such a wide surface as the 4 feet will prevent any profitable collection of amalgam. Yet over the smaller surface of 20 inches, always at a less grade (about 1½ inch to the foot), owing to the greater clearance of the sulphurets and the concentration of the pulp, the amalgam by its gravity will be attached to the plate in sufficient quantity to be collected. There should be no free gold, unamalgamated at this distance from the mortar, and, therefore, the pulp does not require to be turned over in the waves as it does on the apron.

No matter how great may be the care and many the appliances, some amalgam and some quicksilver will escape, and even below the trap in a 4-inch sluice, at a grade of ½-inch to the foot, a groove or cross riffle will accumulate an appreciable amount of amalgam and quicksilver in the course of a month's run. In 1889, in replacing the worn out tailings sluice below the Golden Star mill of 120 stamps at Lead, South Dakota, sufficient amalgam was found, where the pulp from each ten stamps fell into the sluice, to pay the entire expense incurred.

This fall was from 1 foot to 15 feet and each stamp was crushing four tons every twenty-four hours. This was not owing to faulty amalgamation, as the tailings below the apron plates never assayed over 50 cents per ton, and the ore carried practically that value in its sulphurets and coarse sand.

Before speaking of another important argument in favor of 20-inch plates, the advantages for saving the amalgam are:

First.—The less grade needed and the consequent greater effect that gravity exerts.

Second.—The less danger of the plates being coated by heavy sulphurets or even sand, and hence the greater facility by which the amalgam can touch and be attached to the copper plates.

Third.—Owing to the narrow surface and the small quantity capable of being saved, that the amalgam is in shape for economical removal at each cleanup and does not require any sweating to remove the thin scale which would form on the wider surface.

Fourth.—That just as much settles on a 20-inch plate as would settle on one 4 feet wide, in the same relative position to the lip of the mortar.

The other argument, that has more weight than is generally supposed, is in the hearing it has on the subsequent treatment of the pulp to save its mineral contents.

Owing to the friable nature of the sulphurets, and their tendency to slime, every effort is made to get the pulp away from the battery and to the concentrating device, with the least crushing in the battery, or long frictional abrading in the sluices. So much so, that without inside amalgamation, the discharge is made instantaneous, and other crushing methods employed in preference to stamps, while in stamp batteries the shape of the mortar has been changed and improved till no ore of sufficient fineness to discharge through the screen receives a second blow and the sliming of the sulphurets is reduced to a minimum. But after leaving the battery, the friction of passing over the plates, the very rolling motion in the waves over the apron plates, adds appreciably to this sliming and must be prevented as soon as possible. Constant practice has shown this to be feasible in a maximum distance of 8 feet, and then the less grade but more easily moving capacity of the 20-inch sluice plate can be employed, saving all the amalgam possible to be saved, while reducing the actual amount of sliming of the rich fragile sulphurets, the richest varieties being always the most fragile. With a length of 8 feet to 12 feet of sluice plate, the pulp can now be carried in a pipe or 4-inch sluice at a less grade, thus further reducing the difficulty the concentrators have in saving these richer sulphurets. Even in cyaniding, better results would be obtained through easier percolation of the cyanide solution and filtration of the gold solution.

The original cost of the plates is a factor that is of little account because no primary expense should be taken notice of in the equipment of a gold mill that would add to its efficiency; but there are other advantages obtained (in my experience in using both methods), with the 20-inch plate, about which I think it would be superfluous to enlarge in addition to those already cited.

W. J. ADAMS, E. M.

San Francisco, Cal.

IN "Notes on Naval Progress," by Lieut. C. L. Poor, issued at Washington, D. C., are official data on the value of fuel oil compared with coal. The Dutch torpedo boat Pangrango, using 700 pounds of oil per hour in addition to its regular consumption of 2800 pounds of coal, secured an added speed of two knots without making smoke. The North German Lloyd vessel Tanglin, burning oil only, secured a speed of one knot per hour greater than with coal, and at less cost for fuel. She consumed thirteen tons of oil daily, as against eighteen tons of English and twenty tons of Japanese coal, and it required but one fireman in place of five. Recent tests of Texas oil and coal made in a stationary boiler furnace by Prof. Denton of Stevens Institute, Hoboken, N. J., showed that 1360 pounds of oil equaled 2240 pounds of coal.

The Finer Issues of Mining.

Written for the MINING AND SCIENTIFIC PRESS by C. H. FITCH.

Some hunters have laid down the rifle to take up the camera. In place of the bleeding carcasses of great and small game about which a hostful tale can be told they are able to show us hooks of glimpses into wild life in its native haunts. The wilderness and the desert are made to tell us again their tale of life, a tale of beauty as well as the beast, of high contrasts of grace and deformity, and all the deeper attributes, cunning, and humor, and coquetry, even benevolence and many others which have their expression in animal as well as in human life. This is one of the finer issues of sport, the common killing, long the main object of sportsmanship being a coarser issue.

The main, yet I am bound to say the coarser issue in mining, is to get gold, or if not gold directly, some of those forms of mineral value which by the alchemy of commercial exchange can be transmitted into gold. The coarseness of this issue is very apparent when a miner having struck it rich and acquired sudden wealth proceeds to blow it in on such delights as appeal to him, the excitements of wine and gaming, grotesque display, and a high speed life that lands him ingloriously in the more misery. Far he it from me to suggest that this is the course of the typical miner. He is very likely to be a shrewd and thrifty user of wealth, like Mackay he lays cables, like De Lamar he plans to go from wealth to wealth, giving his name to great metallurgical works and towns in several States advancing the art of mining, like many another he turns to politics, or to that small, but distinguished reserved box in politics—the United States Senate. Yet with all this, when we consider the vast rapidly acquired fortunes that have been made in mining it is significant that mining millionaires do little for mining as mining, as a science in which scientific research might develop instrumentalities more powerful than would ever be found by private service, as a profession to be exalted in honor, and protected against the many forms of trickery which now harken upon it, as a brotherhood in which those who have failed of the main coarse thing, money getting for themselves, shall at least find a pension and hospital for their declining years. Many and rich are the beneficiaries of mining, but mining is a poorly endowed institution, the packhorse of greed left to perish where it can no longer carry.

Yet mining for its own sake is often an absorbing passion. It is worthy of being an objective point in itself without any measure of the value of the services given it that is commensurate with dollars. The story is told of an Eastern bridge builder whose friend called him to account because he made little money, while contractors on his bridge work amassed large fortunes. "The fact is," said the old man, "I don't make money; I make bridges." Yet had it not been for the drive of the money getting power it is probable that we would still be satisfied with old foggy bridges, and the Atahara bridge incident would not have given our British cousins one of the most significant of their alarms over American competition.

Yet I would like to see a miner who was first of all a man, and a finder of values without losing his dignity in them. Humboldt was an explorer and a massive grand figure. The prospector is an explorer, but he is likely to get weazened and "codgery," wizzled up amid desert sands, and frozen blue amid Arctic snows, a racked and tortured sacrifice of a man. The era of human sacrifices is by no means past, and a human sacrifice, though always a subject of religious consideration, is not usually to be commended, especially when it is a sacrifice to small motives and unfruitful folly.

If in sport there are finer issues than the animal murder, in mining there are finer issues than the degradation of men to money ownership. There is first the man himself inured to unusual hardihood, to long stretches of self-denial, to great fidelity of purpose. He is not a weak man. The multitude in the Scripture did not go out into the wilderness to see a reed shaken with the wind, nor a man clothed in soft raiment, not to see a courtier or a dude. They went out to see a prophet, a man of large stature, rougher apparel, living closer to nature's heart. What miner is not a prophet! Some may be false prophets cherishing illusions, but they have the great hope, and live upon it when the grubstake runs low. And they acquire daring to make great ventures, and fortitude to be good losers, and the patience of many Jobs, and the depth of long silence. When our affairs of State are played with by officers of fickle and shifty temper it may be worth while to hethink ourselves that mining educates men of steeper and more enduring purpose, men who pursue a valuable end patiently through discouragements and vicissitudes, men who shoot with a long how.

Besides the man, there are also the aims and the arena, and these are all that can be used to furnish any epic or heroic tale. The arena is hristling with aspects not yet seen, not yet made manifest. Its walls whisper secrets not yet heard, because the croak of gain has drowned them out in the "heavens above and the earth beneath and the waters underneath the earth." And the arms from pick and shovel have developed to great lengths of ingenuity

and complexity, and assume protean shapes in rendering violence, the power of the silent wire, and machinery which incessantly breathes that it may as incessantly strike.

All these multiform things so scantily outlined constitute finer issues legitimate to mining interest; craft and science and art and more than art, that are beyond the item of mere acquisitiveness.

Science fascinates, but there is something stronger. I was at a New York hotel whose corridors compassed the most of a block, and I heard a lady who had walked the length of them asked how far it was, and she answered in the words: "Half a mile by yourself, quarter of a mile with a man who can talk of science and art, and a furlong with a lover." That is after all the finest issue of mining, the affection for it though it be a hard master or prodigal rewarded, the loyalty, the patriotism, the pride of mining as a thing in itself so wrought into the spirit and associations of a man that he feels it his inalienable own.

Mine Valuation by Mining Experts.

There exists a very vague conception of what a mine really is, and an attempt to define a "mine" so as to distinguish it from a "prospect" or a "quarry" will at once make evident the truth of this statement.

Neither the geological origin of the mineral product nor the uses to which it may be put can be used as restrictive clauses or adjectives in the definition of the word "mine." Nor is the manner of working the deposit a criterion, for open-cut coal and iron mines are very common, while underground quarries are not unknown.

The distinguishing feature that marks the difference between a mine and a quarry is the comparative rarity of the respective products geologically considered. Salt, coal, leaf mica, iron ore, etc., are comparatively rare products, and, being such, may be spoken of as limited in volume. We think, therefore, that either the word limited or the word rare should enter into any exact definition of the term "mine" to differentiate it from "quarry."

Some clear distinction should also be made between the terms "mine" and "prospect," for so long as unexplored hodies of mineral are termed "mines," just so long will discredit and doubt attach to the mining business. We believe it, therefore, quite as essential to define the word "mine" as the term "ore in sight," and to use the word strictly as defined.

A "mine" may be defined as that part of a deposit of comparatively rare mineral which has been blocked out and explored by cuts, shafts, drifts, tunnels, inclines, or the like. If the mineral deposit has not thus been blocked out, it is a "prospect," and that part of a partially explored mineral deposit lying beyond the limits of the exploratory or development work is of prospective value, and should not be included as a part of the mine in estimating values; for no scientific valuation of a "prospect" is possible, and any attempt at such valuation is a mere guess.

The valuation of a mine, however, is probably easy of solution by a competent mining expert, so far as the elementary principles to be followed in the valuation are concerned. Of course, in the application of these principles, different experts will assign varying values to different quantities, and there may be large variations in the final results.

An example of these varying values was afforded in a paper read at the recent New Haven meeting of the American Institute of Mining Engineers by Dr. Rossiter W. Raymond, secretary of the society.

A certain copper mine had been estimated as having actually in sight sufficient ore to net \$2,000,000 a year for five years, and the owners of the property asked \$10,000,000 for it. Dr. Raymond's opinion was that the mine was actually worth not much more than half the price asked, even conceding the accuracy of the estimate of the ore in sight. In arriving at this conclusion, his reasoning was as follows:

It is axiomatic that a sinking fund should be established, and such a part of the earnings of the mine should annually be placed in this fund, that, compounded at the ordinary rate of interest on safe investments, say, 4%, the amount at the end of the life of the mine will equal the purchase price. Second, the life of the mine should be assumed as being no longer than it would take to mine the ore in sight, which in this case was five years. Third, that the net annual profits on the investment, after deducting the sum set aside for the amortization fund, should be figured at not less than 20%. When his clients suggest 10% as being a fair annual return on such an investment, Dr. Raymond's reply is always that 10% can be earned on perfectly safe investments in the West, such as county and city bonds and warrants.

While we agree with the general proposition that a mine expert's valuation should be on the conservative side, it seems to us that Dr. Raymond's claim of 20% as a fair return on capital invested in mining can hardly be accepted in these days of low interest rates. It is true that county and city securities bearing 8%

to 12% can be bought at par in some parts of the West, but only in very limited amounts, and they usually mature within a few months, or even weeks, necessitating the constant presence of a local agent to attend to presenting the paper for redemption and to the reinvestment of the freed capital. To make the matter even worse, the paper usually carries on its face no date of maturity, but when funds sufficient to redeem it are in the treasury it is called in by a notice in the local newspaper, and after being so called in it ceases to bear interest. Should the paper by chance run several years, the interest is not paid until its maturity anyway, then being figured as simple and not as compound interest. It is evident, therefore, in view of these considerations, that after deducting the commission of the local agents a large investor will have little more than say, 6% net earnings from his capital even on 10% securities. There is, besides, the further fact to be considered that the total sum which could be so invested will be found to be a surprisingly small one. When Eastern capital invested in the West receives more than 4% to 6% it is because of two added factors; first the managerial item, second the item of risk. We have seen how the managerial item enters into the interest rates on Western collateral of the kind in question, and a brief consideration of this subject makes it also clear that the smaller the investment of capital in business the greater the relative cost of this very item—the cost of management. It frequently takes very little more time of a manager to look after an investment of \$1,000,000 than one of \$50,000. The smaller investment, however, would have to earn a nominal 10% to leave a net 5% if the manager received \$2500 a year as salary, while the larger million dollar investment by earning only 6% would still leave a net 5% after paying the manager \$10,000 in commission or salary. Much more might he said on the subject, but it is hardly worth while, for in the great majority of cases it is not the province of the expert to tell his client what he ought to expect as interest on his capital. The capitalist's experience in such matters, as a rule, qualifies him to be more of an expert than the "expert," and—he it said in a whisper—he doesn't care a fig for the engineer's expression of opinion further than his expert knowledge of mining qualifies him to speak.

Coming now to the element of risk in mining, we are upon grounds where the expert must be consulted. First let us ask what the elements of risk are, by which we mean the risk of the engineer's estimate being too low as regards the cost of production, or too high as regards the yield of the mines. The sources of error appear to be:

- (1) Error in estimating the number of tons of ore in sight.
- (2) Error in getting a fair average sample of the ore.
- (3) Error in estimating the costs of breaking down ore, hoisting, pumping, ventilating and timbering.
- (4) Error in estimating the rates of wages that must be paid.
- (5) Error in estimating the cost of milling and smelting and the accompanying losses of metal or mineral.
- (6) Error in estimating transportation cost.
- (7) Error in over-estimating the market price of the product, which is liable to fluctuations.

Since the mine is assumed to be a mine in the real sense of the term, the likelihood of committing serious error in (1) may be regarded as of no great importance if the mine valuer is of ordinary skill.

Error (2) in getting a fair sample of the ore is in some cases very slight, coal and iron for example; while there are classes of deposits where it is almost impossible to get a fair sample, as, for example, the pockety deposits of cinnabar in some California mines. Except in the case of the more precious minerals, we may say that large errors in the sampling are not probable; and even in the case of deposits of precious metal, it is very often possible to get a close estimate, as illustrated in the working of some of the large hydraulic placer mines. In any case the expert should make clear in his report the extent to which his estimate of the quality can be relied on.

The development work should have reduced to a minimum the liability of erring in estimating the cost of drainage, etc., so that error (3) is of little moment.

Wages, of course, are liable to fluctuate in every line of business. Labor unions may, it is true, force the price of labor up, but so long as labor unions do not commit the folly of restricting a man's output, or of fighting labor saving devices, it is quite certain that improved means of handling ores and treating them will offset any rise in wages. This statement is substantiated by the census statistics for coal and iron mining in the United States. Hence error (4) is practically eliminated.

The cost of concentrating and smelting an ore is, next to fair sampling, the most difficult part of the problem, since to ascertain the proper method of treatment may require much experimenting. The larger the investment to be made the more certain will be the accuracy in estimating this item, for where it would not pay to spend several thousand dollars in experimental work on an ore from a very small mine, it most assuredly would pay where the

mine is a large one; so that the larger the mine the more certain is it that the cost of production will be susceptible of accurate estimate.

The cost of transportation is far more likely to decrease than to increase, so if assumed at existing rates there is very little chance for error (6).

Finally, coming to error (7) it may be said that all products fluctuate from year to year, the products of the mines no more than the products of the factory or the mill. The price is simply dependent upon the relation of supply to demand, in the long run being the cost of production in the poorest mines operated, plus fair profits. Since it is impossible to foretell just what the relation of supply and demand will be, and since all manufacturing ventures are upon just the same footing as mining in this respect, we may say that the expert is justified in assuming existing prices, leaving it to the capitalist to decide what to allow for this element of risk.

From the above discussion it would appear that so far as the expert is concerned the liability to err will depend entirely upon the particular mine he is estimating. From which it follows as a corollary that any general statement, such as that made by Dr. Raymond, to the effect that capital in mining should always have at least 20% net profit to warrant its investment, is not justified.

Abundant capital is seeking investment in these days, not only in investments where safety is assured, but in investments of greater or less risk, provided only that the return is commensurate with the risk. If the mine valuer does his work well, there will be as much or more chance that the property will turn out better than his estimate as that it will fall below it. Of course such investments are not proper for savings banks or the trust funds of widows or orphans, but the capitalist accustomed to take risks is often willing to balance the risk of gain against the risk of loss. It is the duty of the competent mine expert to present both these risks fairly to his client and leave him to decide as to their acceptance.—Engineering News.

THE extensive use of electric power in the Rhodesian mines is significant of the future of electrical engineering in South Africa, says the "Electrical Engineer," London, especially where the water power is available and fuel is relatively scarce. The purposes to which electricity is put in the mining operations of that country may be shortly summarized under five heads—i. e., winding, haulage, pumping, ventilating and cutting. The whole of the apparatus is usually on the surface, and nothing probably would be gained by placing it underground, except for the hauling, pumping and cutting operations. The usual working E.M.F. is five volts for the generator, and 450 volts—allowing a drop of fifty volts in the cables—for the motors. This pressure is found to be suitable for the ordinary mines, and is well within the limits of direct-current drum-wound machines. Within the last year or two the claims of polyphase machinery have been strongly urged for mining work, and particularly in South Africa, and there is little doubt that for extensive mines, where the motors are at a considerable distance from generators, polyphase machines are the best. But for ordinary mines 500 volts has been found a convenient and safe pressure. Among the most recent schemes for the electrical equipment of mining properties in South Africa is the one in Rhodesia, which proposes to use polyphase currents. The scheme provides for the harnessing of the waters of the Maquaddi river, and is estimated to cost \$500,000, including construction of dam, conduit and power plant. The work will take about two and a half years to complete, by which time it is expected at least 1400 H. P. will be available. Both the electric power and lighting plants are to be on the three-phase system.

THE Lahmeyer Co., Frankfurt-on-Main, Germany, furnishes an example of an electric three-phase plant at their Zollverien colliery, at Catenberg, near Essen, entirely for pumping. The mine is over 1200 feet deep, the pump raises 673 gallons of water a total of 1350 feet. The generating plant consists of a flywheel, three-phase alternator driven by a vertical tandem-compound engine, the alternator furnishing 300 kilowatts at 1000 volts between phases. The current is conducted down the mine shaft by two concentric-armored cables, supported every 315 feet by iron cleats, wood lined. The motor is rated at 350 H. P., and is directly connected to the pump, running at sixty revolutions per minute. The pump is of the duplex, differential type, its plunges being 5 inches and 7 inches in diameter, with a stroke of 40 inches. The motor weighs thirty tons, and was taken down the mine in pieces, being put together and erected there. The diameter of the stator of the motor is 15 feet. The engine on the surface indicated 426 H. P. when the pump was raising its 673 gallons 1350 feet, giving an efficiency between the cylinder of the driving engine and the power actually expended in the water of 60%.

A LACUSTRINE deposit of gold occurs in gypsum at Lake Austin, Murchison, West Australia, where, in a conglomerate of metamorphosed rocks, diorite and quartz, cemented by gypsum and oxide of iron, has been found free gold from a color up to 28 dwts.

Smelting on Vancouver Island, B. C.

Written for the MINING AND SCIENTIFIC PRESS.

James Breen and H. C. Bellinger in December, 1901, made arrangements to build a smelter at Crofton, on Oshorne Bay, on the east coast of Vancouver Island and about 50 miles by water or 40 via the E. & N. Railway from Victoria.

Contracts were made with the management of the Lenora M. Co. for the entire product of the Lenora mine as a base for ore supply for a customs smelting plant having a capacity to treat 700 tons of ore per day.

Clearing in the forest for the smelter site adjoining

and general manager, H. C. Bellinger, assistant manager and metallurgist in charge.

The system of trackage connected with the narrow gauge railroad from the Lenora mine at Mount Sicker to the smelter site has been arranged with a view of handling all the materials as expeditiously and economically as possible. At a point about 1000 feet west from the smelter buildings this narrow gauge road branches in a Y shape. The northern branch has been built to and along the wharf, which is 750 feet long, and arranged with a ferry slip so that loaded cars can be transferred from a car ferry. The southern branch extends across the track scales, thence up a trestle over the receiving bins on the west side of the sampler, while another branch has been built over the delivery or furnace bins on the

The capacity of this sampling mill is 1000 tons of ore per day of twenty-four hours. The furnace building, 120x50 feet, is covered with corrugated iron; the floor of this building is 8 feet below the charging floor. Adjoining this building on the east is the converter building, 120x40 feet, the floor of which is about 8 feet lower than that of the furnace building; and on the same level with the floor of the converter building, and adjoining it on the east, is the copper house, from which the blister copper, the product of the converters, is shipped to the wharf on the track already referred to.

In the furnace building are three furnaces—one water jacket furnace of 350-ton capacity; one Garrettson furnace, in which it is proposed to experiment and attempt the performance of the operations of smelting and converting in the one furnace; this has also a capacity of 350 tons per day; and one 50-ton concentration cupola furnace.

The ore, with the necessary fluxes and coke, is fed into the furnaces from the charging floor, and the air blast is furnished by two blowers, supplying 150,000 cubic feet of air per minute, driven by an 18"x42" Corliss engine, so fitted that at any time it can be compounded with more power, if required. The smoke and waste gases from the furnaces pass through the downtakes to the dust chamber, which is constructed of brick, 200 feet long, 12 feet wide and 20 feet high. This is connected with an expansion chamber 40x20x20 feet, which communicates with the circular brick stack, the interior dimensions of which are 12 feet in diameter, 120 feet high.

The matte from the furnaces is converted in two converters, each having a capacity of fifty tons of matte per day. The handling of the converters and mould carriages is accomplished by hydraulic gear, the power for which is furnished by a large Smith-Vaile pump and accumulator located in the engine room, which is 60x60 feet, situated a short distance north from the furnace building, and in which are also installed the Corliss power engine, blowers, condenser of 1000 H. P. capacity, and dynamo for lighting the entire plant with electricity. Steam to run this machinery is brought from the boiler house, situated a short distance to

the north, a building 60x40 feet, in which are three 200 H. P. return tubular boilers.

Adjoining the boiler house on the east is a building arranged for machine shop, carpenter shop and blacksmith shop. The buildings throughout are of wood, covered with corrugated iron.

To the north from the boiler house, 200 feet distant, is the assay office, erected with especial attention to furnishing accommodations. Westerly from the assay office about 200 feet is the general office of the smelting company.

The smelter has its own water supply, the source of which is derived from a lake about 2 miles distant and 400 feet high, where a retaining dam has been constructed. The water is carried from this reservoir through a flume about 1 mile long, which discharges into two 100,000-gallon tanks at an altitude of about 200 feet above the smelter, whence it is piped through about 5000 feet of 8-inch main, which gives ample pressure for fire protection and other purposes. In addition to this water supply the company have acquired 1000 miners' inches of water in the Chemainus river, distant about 3 miles.

Death From 110 Volts, Alternating.

This is the first genuine case the writer has met with of death from a shock at 110 volts, alternating. The case recorded occurred in the Concordia mine, at Oberhausen, in Prussia. There is a service at the mine of 110 volts, alternating, at the generating station, which is transformed down to 200 volts for power and 110 volts for light. The lighting was by 16-candle incandescent lamps. A workman was engaged in attending to a particular lamp underground. The lamp was fed by a pair of wires one millimeter in diameter, covered with rubber, and with impregnated jute overall, and the wires leading to the lamp were coiled up in a spiral of three millimeters in diameter in the usual way, the spiral being further protected by a covering of rubber and cotton impregnated with compound. The reason why the man was killed does not seem to be at all clear. He was seen by two other workmen attending to the lamp as they passed him, and shortly after, on their return, he was calling out for them to turn off the current, he being then lying on the ground. The two workmen went to the machine house, which was about a quarter of a mile away, and instructed the attendant to switch the light off. The attendant did not appear to have understood. At any rate, on the return of the two workmen to the place where they had left their comrade, he was found to be dead. Autopsy showed that he was in good physical condition; the verdict, after a careful inquiry, was that he died from the 110-volt shock, alternating, and the authorities state that in their opinion it must be taken that the lowest pressure for alternating currents that can be



Northwestern Smelting & Refining Co.'s Plant, From the Sea—Crofton, Vancouver Island, B. C.

the townsite of Crofton was begun about the middle of December, 1901, and the sampling mill was started up about the middle of June, while the smelter was blown in about the middle of September. When it is considered that in addition to clearing the virgin forest during the winter season, that about 17,000 cubic yards of excavation had to be made in order to locate the dust chamber, furnace, converter and

east side of the sampling mills. Another branch has been built for a coke track from the wharf to a point beyond the furnace building. The rails for this have been laid in a space between the furnace bins and the dust bins. This track branches off from the main line from a point near the shore end of the wharf. Still another track has been built close to the shore line to connect the copper room with the shore end of the wharf. In order to facilitate the handling of both narrow and broad gauge cars this entire system of trackage is laid with three rails, and work of switching the cars from point to point is performed by the company's own "Sbay" locomotive.

After the loaded car has been weighed and the weight registered automatically by a modern device attached to the beam of the Fairbanks scales, if it contains ore it is switched on to the track over the receiving bins, of which there are six in number, each having a capacity of 300 tons, and the ore dumped into one or other of these bins. From the bins the ore is drawn through a gate worked by a lever into ore buggies and wheeled 30 feet to a crusher 20x15 inches, set in a pit in the foundation of the sampling mill. The crushed ore is then carried by a bucket elevator 85 feet to the top of the sampling mill, where it passes through the first sampler, and the portion cut out for sampling is fed into a smaller crusher, from which the sample passes to the roll, and finally after passing through three sets of rolls is deposited on the lowest floor of the sampling mill and taken to the assay office, where it is ground to pass through an 80-mesh screen, quartered, and the final sample for assaying taken. The bulk of the ore, after being carried to the top of the sampling mill by the first bucket elevator, passes through chutes into either the furnace bins or to the roast heap bin located on the north side of the sampler. If to the latter the ore is drawn out into tramcars, which run on a track level with the tops of the ore bins, and which extends to the west of the sampling mill, a short distance, and is so that the loaded trams can be discharged onto the pile of ore being built up for open roasting. If the ore is discharged into the furnace bins to be smelted raw, it is drawn through the gates worked by levers into ore huggies run onto a platform scale, where the charge is weighed; thence onto the charging floor of the furnace building, which is on the same level as the ground floor of the sampling mill and the platform over the roof of the dust chamber. There are eight furnace bins, each having a capacity of 300 tons. The distance between the gates of the furnace bins and the furnace is about 50 feet. A portion of the space is occupied by the coke track and the balance by the roof of the dust chamber. The two lines of bins extend from north to south parallel to each other with the sampling mill occupying the space between. The sampling mill is run by an independent engine installed in a room on the ground floor of the mill, and which receives its steam from the main boiler house.



Northwestern Smelting & Refining Co.'s Plant, Front View.

copper buildings to the best advantage, also the grading and laying a complete system of trackage as well as building wharf, ferry slip and the erection of the smelter plant itself, the time occupied has been very short, but would have been much shorter



Northwestern Smelting & Refining Co.'s Plant, Looking South.

had not the completion of the plant been delayed because of the tardiness of the machinery manufacturers in the United States in delivering the machinery, owing to strikes and lockouts.

The smelting company has been organized as the Northwestern S. & R. Co., James Breen, president

considered safe should be considerably reduced from previous ideas.

There are two possible causes in this case. One is that there was a partial connection between the primary and secondary service, and that the man who was killed got the benefit of a portion at least of the primary voltage. The other cause is evidently the time factor, which has been shown to have such an important effect in these cases. In the writer's opinion, it is perfectly possible to kill by a pressure of only 110 volts, continuous current, if you take sufficient time. If the Chinese ever want some new kind of excruciating torture, the recommendation might be made to them to try tying a man to a 110-volt service, making good connection, and leaving him there until he hands in his checks. It would be a brutal method, but probably not more so than some of their existing methods. Anyone who has tried the experiment of taking hold of terminals in connection with a 100-volt service will know that at first, and for some little time, nothing is felt, then gradually a sense of heat develops, which increases, and, if hold is continued, pain commences, and gets sharper and sharper.

In the present instance it is not stated how long the victim had been in connection with the service when the other workmen saw him lying on the floor. It would take them some little time to go a quarter of a mile on mine roads, which are very heavy for walking, and it was stated that the order to turn off the light was not understood, as the lamp was still burning when the men returned to it. So that it is probable that the victim was in connection with the service for something like half an hour. It must be remembered that with alternate currents the pressure which operates upon the human body to give shocks is the top pressure of the alternation. That is to say, with a 110-volt service the acting pressure on each side of the alternation would be 110×1.41 volts, or 155 volts. In addition to this, since the alternations follow each other at intervals of a small fraction of a second, the double maximum pressure will be felt in the shock. The nerve will be subject first to the maximum pressure in one direction, and immediately after to the maximum pressure in the opposite direction. So the shock would be due to 310 volts in this case, plus any induction that might arise. And this is not all. The above refers to shock alone. But after the shock had contracted the muscles and prevented the victim from losing his hold, a current would pour through the body, and this current will be that due to 110 volts; but, being an alternating current, it will not be subject to such a high induced back pressure within the body itself, as a continuous current would from the motion of the fluids in the blood vessels in opposite directions.—S. F. Walker, in *Electrical Review*.

Two Suggestions.

TO THE EDITOR:—In the overflow of "Concentrates," on page 219 of the issue of October 18, regarding that brassy copper plate I have had something to do, and on a recent visit to a small quartz mill found there was trouble, the plates being exactly as described in your correspondence. Inquiry showed that everything that a man having some little knowledge of chemistry or metallurgy could be expected to do had been done. I asked the millman to stop the mill, wash the plate, and bring a lump of cyanide. When the plate was washed, with the cyanide in one hand and a silver piece in the other, on a small spot near the head I rubbed alternately with the silver and cyanide. In a few minutes the spot thus rubbed became bright. Other hands then took hold, and within a short time that plate was brought into good working order, and it was kept so until a new plate was put in its place. Dry chloride of silver, pulverized cyanide of potassium, and crushed quartz sifted through a 100-mesh sieve, mixed together, and rubbed on dry at first, then just enough water to make a paste, using cork as a rubber, will generally cure a sick plate. Mix a trial lot and get the best proportion for each case.*

In "Colorimetric Estimation of Gold" "Concentrates" gives chloride of tin as a final test for the presence of gold, but I have good reason to doubt this long-established standard as reliable in all cases.

Wanting a quantity of purple of cassius, I put some native gold in nitro-hydrochloric acid, obtaining a saturated solution of metals present. Diluted in water, and adding chloride of tin solution, there was no visible effect; more tin solution was added without change in appearance. I added aqua ammonia and shook well; this produced no visible change. I then kept on adding ammonia, drop by drop, in the same spot, until a slight turbidity appeared, for an instant only; then a larger quantity of ammonia was added, and a dense yellow-white precipitate was formed. This precipitate was dried. A very small portion was put on charcoal and heated. No sign of fulminate being found, the precipitate was collected in a lead foil dish, scorified and cupelled, yielding a normal gold button. A second solution was made as before, and metallic tin suspended in it for several days gave not the slightest color.

Jacksonville, Oregon.

JOS. VOYLE.

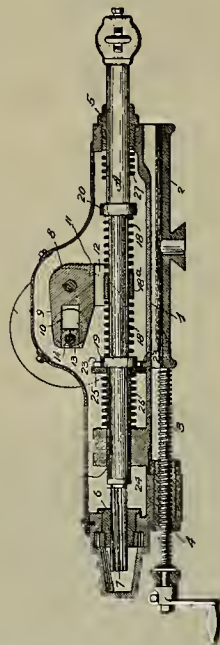
*The less cyanide on a plate the better, for the remedy is worse than the evil it is intended to cure. Continued use in the manner indicated will tend to make the plates so hard that the mercury will not adhere to them, but tend to gather in globules and disappear with the pulp passing over them.—Edison.

Mining and Metallurgical Patents.

Patents Issued October 28, 1902.

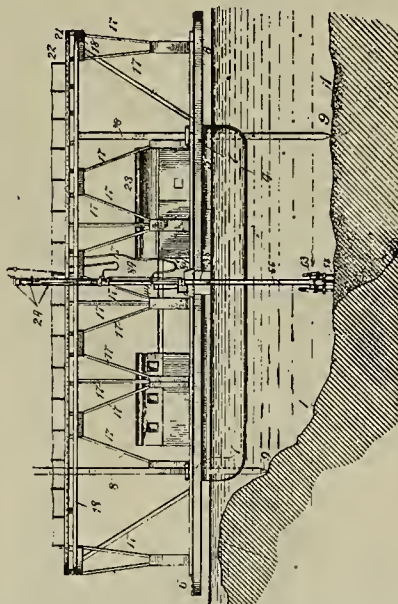
Specially Reported and Illustrated for the MINING AND SCIENTIFIC PRESS.

BUFFER DEVICE FOR ROCK DRILLS.—No. 711,998; R. B. McConney, Denver, Colo., assignor to the Mine & Smelter Supply Co., Denver, Colo.



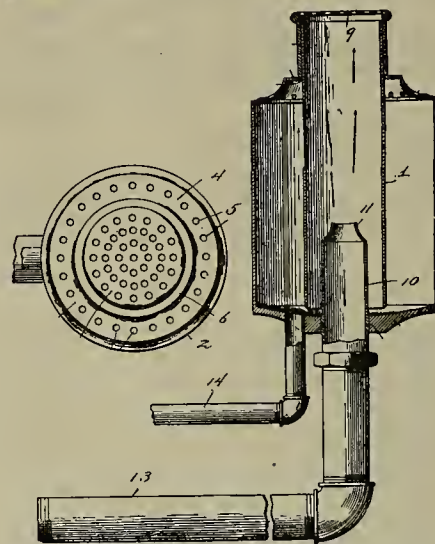
In recoil huffer device for rock drilling engines, combination with casing, crank arm and drill holder, of an abutment collar mounted on drill holder, sleeve mounted on drill holder hearing at one end against abutment collar, means for securing sleeve on drill holder and for holding sleeve against collar, fixed collar extending transversely across casing, axial bore in collar surrounding loosely sleeve, second transverse abutment in casing adjacent to drill holder abutment collar arranged to allow drill holder collar to pass it during reciprocating action of drill holder, washer loosely mounted on sleeve adjacent to second named abutment and compressive coiled spring mounted loosely on sleeve arranged under slight expansive tension between first named collar abutment of casing and washer, whereby washer is held against casing's second named abutment in path of recoil movement of drill holder's abutment collar.

SUBMARINE ROCK DRILLING AND BLASTING APPARATUS.—No. 712,002; R. J. Packard, Morristown, N. J.



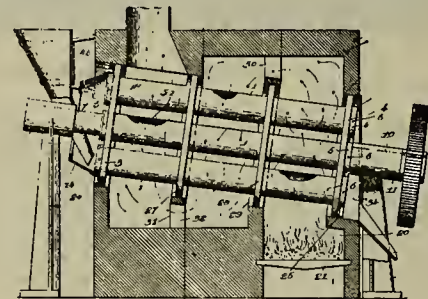
Submarine drill mechanism, tube, means to support same in suitable position resting on bottom in combination with drill, a guide sleeve run on drill shaft, sleeve having conical edge and of size to wedge centrally in drilled hole, also longitudinally corrugated, pipe passing through one corrugation, by means of which water may be forced to drilling point and out of drilled hole through other corrugations, tube being also provided with apertures above mud line, out of which water thus forced in may escape and carry therewith particles of rock as same are broken by drill.

FURNACE BLOWER.—No. 712,235; H. R. Arthur, Longmont, Colo.



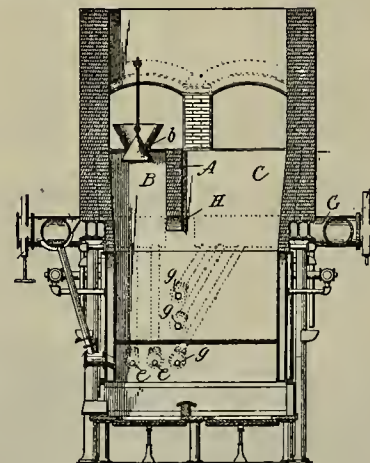
Combination of cooling chamber having perforated top, condensing chamber concentrically disposed in cooling chamber projected upwardly through top of latter, lower end of condensing chamber being above bottom of cooling chamber, foraminous cap fitted over projecting extremity of condensing chamber, steam-injecting nozzle extending upwardly from bottom of cooling chamber into condensing chamber, having steam supply pipe connected thereto, drip pipe eccentrically attached to bottom of cooling chamber.

DRIER FOR ORES.—No. 712,258; A. G. Campbell, Sherbrooke, Canada.



In mechanical drying apparatus, series of imperforate, open-ended cylinders arranged in parallelism about common inclined longitudinal axis of rotation, circular heads having openings to receive ends of cylinders, to which they are secured, heating chamber inclosing cylinders, having end openings closed by heads, means to rotatably support group of cylinders, feed hood inclosing open inlet ends of cylinders, to direct thereinto material to be treated, intumed segmental retaining lip at inlet end of each cylinder, located on portion of circumference of cylinder nearer common axis of rotation.

SMELTING FURNACE.—No. 712,374; W. F. Hannes, Deming, N. M.



In furnace, partition extending from upper part thereof part way toward bottom, whereby fuel compartment, having communication at lower end with body portion of furnace, is formed, means for supplying fuel to fuel compartment, means for supplying ore to body portion, valve-controlled tuyeres for supplying oxygen to fuel below compartment, independently controllable means for supplying oxygen to ore in body portion above level of first named oxygen supply.

Mining Summary.

Specially compiled and reported for the
MINING AND SCIENTIFIC PRESS.

ALASKA.

The September return of the Alaska-Treadwell mine was as follows: The 220-stamp mill ran 30½ days; the 300-stamp mill ran 30½ days, crushed 87,708 tons; estimated realizable value of hullion, \$84,477; saved 1745 tons sulphurets; estimated realizable value of same, \$82,983. Working expenses for month, \$68,609.

President Roosevelt, in his annual message to Congress, will devote a paragraph urging better mining laws and provisions governing public lands in Alaska.

ARIZONA.

COCHISE COUNTY.

At Douglas Superintendent I. L. Merrill expects the Calumet smelters will blow in next week.

GILA COUNTY.

The Globe Silver Belt says the Old Dominion mine resumes operations at the rate of 800,000 pounds of copper per month, with a saving in the cost of 1½ cent per pound—by reason of reduced freight rates—compared with the cost at the time the mine was shut down, September 12.

The Black Warrior Copper Co., Amalgamated, has resumed at the mine and leaching works. Four new leaching vats are to be constructed, also a blast furnace for the reduction of slag from the refining furnace and ores not adapted to leaching.

GRAHAM COUNTY.

A. P. Ayling, president New England Copper Co., Clifton, Arizona, tells the El Paso Herald that the Arizona Co., a Scotch syndicate, is averaging about 45 tons of refined copper per day, or from 1200 to 1400 tons per month. It is putting in new machinery and is operating its five large furnaces that replaced the old ones. This company has been very successful. The Detroit Copper Co. (Phelps-Dodge people) are turning out about half what the Arizona Copper Co. is. It is also putting in new machinery.

The New England Copper Co. has done about 4500 feet of development work within the past year 3 miles from Clifton, where there are fissure veins distinct from the blanket formations of the other parts of the district. The rock is hard and has not been leached out. They are operating six electric drills. He expects to put in a smelter—small at first, probably a 200-ton plant—just as soon as is determined the best method of treating the ores. The company owns twenty-two claims and most of the work has been done on the Copper Bullion and Solid Copper claims, on the same vein. There are two shafts down about 600 feet each. Two tunnels cut these shafts at the 200 and 450-foot levels. The lower tunnel, which has been started recently, crosscuts from the Monte Carlo claim, about 600 feet, and then will run in on the vein of the two first mentioned claims and will strike the two shafts spoken of on the 1000-foot level. This tunnel will be about 3500 feet long. The company has been fortunate in striking good ore. The pay-streak is running about 5 to 6 feet of copper glance and is now yielding ore that contains \$1000 to \$1200 in values per day. For every dollar put into the work there is \$2 worth of ore on the dump from the development alone. No ore has been shipped and it is all piled on the dump. On both sides of the New England Co.'s property the Clifton Con. Co., of which L. A. Dunham is general manager, is pushing ahead.

The train over the 22-inch railroad from Longfellow to Metcalf is superseded by the new 36-inch narrow gauge railroad. The "baby gauge" was built in the early '70s, the first railroad ever built in Arizona.

The Era says the development work done in the Coronado M. Co.'s properties shows favorably. The tunnel has been continuously in ore, lowest assay 8.4% copper.

MARICOPA COUNTY.

At Phoenix last week were incorporated Mesquite Springs Gold Co., B. A. Stevens, A. F. Blank of Los Angeles; Timber Lake M. Co., J. Goodie, W. F. Church, I. J. Ordway of Colorado; Tres Mines M. Co., J. Ashcroft, C. K. Hill, J. M. Wyatt.

MOHAVE COUNTY.

The Miner says there are 100 men on the Gold Royal payroll. More men are being put on.—The Elkhart Co. is at work on the new plant.—The Minnesota-Connor is shipping rich ore.—Men will be put on the Queen Bee mine at Mineral Park.—The Tennessee mill is running, but work may be interfered with by

the non-arrival of fuel oil. Scarcity of cars in the oil districts makes transportation slow.

C. A. Ellis is experimenting with the ores of the Gold Basin country, and finds that they are susceptible to cyanide treatment.

Superintendent Barry is preparing for extensive work on the Gold Nugget mine at Cerbat.

Carl F. Shader, general manager of the German-American M. Co., has closed a contract for the sale of the company's property to W. Bayley of Los Angeles for \$50,000. The property of the German-American M. Co. is in San Francisco mining district, 19 miles northeast of Needles, Cal., 27 miles northwest of Kingman, comprising fourteen claims.

PINAL COUNTY.

Near Florence the bottom of the Alice shaft is reported in solid iron, thought to be a spur from the main ledge, as the main ledge is to the south and in the foot wall on the side of the shaft. The flow of water in the shaft amounts to 54,000 gallons in twenty-four hours.

YAVAPAI COUNTY.

Colorado and Boston men will work the Planet copper mine on Bill Williams Fork of the Colorado river. A wagon road will be built to the Santa Fe Railroad and a 50-ton smelter built in addition to the old 30-ton smelter of the old Matilda Co. The mine is said to consist of six large parallel veins ranging from 60 to 120 feet in width.

At Jerome, part of the tramway above the smelter will be taken to the Iron King to be used there to tram from the mine to the smelter to be built to work the ore from that mine.

YUMA COUNTY.

At Quartzite, J. A. Rivers, superintendent Success Copper M. Co., has men grading for a hoist. The company contemplates erection of a smelting plant.

CALIFORNIA.

ALAMEDA COUNTY.

The Tesla Railroad is to be extended to San Francisco.

ALPINE COUNTY.

At Blue Lakes the work in progress there will be not completed for some time; it includes several dams, some of them 80 feet in height, constructed of solid masonry, and involves an expenditure of \$1,000,000. The ultimate object of this work is to supply San Francisco and interior towns in California with electric light and power. The company employs every man who applies at \$1.75 per day; when the price of board is deducted, it leaves him about \$1.15 per day for his labor.

AMADOR COUNTY.

The Ledger says at the Zella the hoisting of rock is suspended to repair the shaft.

The Horn mine, near the Defender, will connect with the 80-foot shaft when taking out ore for milling will begin. The ore body is reported 6 feet wide and runs from the tunnel level to the surface.

BUTTE COUNTY.

The Butte & Plumas Railway Co. has incorporated at Oroville to construct and operate a railroad, standard or narrow gauge, from Oroville to the junction of the North Fork of Feather river and its east branch; estimated length of road, 55 miles; H. H. Yard, E. H. Benjamin, A. M. Hunt, A. Ekman and C. Gray; capital stock, \$1,000,000—\$65,000 actually subscribed.

FRESNO COUNTY.

A new gas plant has been established, for the manufacture of gas solely from crude petroleum, at Fresno. The heavy fuel oil is pumped from a tank directly into generators.

KERN COUNTY.

At the Dean & Jones mining operations at Arondo, between Ballarat and Johannesburg, the ledge is 120 to 150 feet wide; the assay value does not exceed \$6 per ton. The ore is quarried out and run through Cornish rolls and taken to cyanide tanks for treatment; assays of the tailings show a loss of not over 10 cents per ton. The company has twelve tanks on the ground. A tramway is projected. The number of tanks is to be increased to give capacity for working 200 tons of ore every twenty-four hours.

At Ballarat the Miner reports the Golden Argus has fifteen men at work and will start the 5-stamp mill. Superintendent J. C. Cress will put men at work on his own property.

At the Ratcliff mine, in the Panamint range, there are about thirty men at work and a 20-stamp mill running night and day. In Old Panamint T. N. Stebbins has men at work on the Curran mine. J. P. Flint is putting in a cyanide plant in Tuba canyon, the property of the Inyo Gold Co.

In Keysville shafts are being sunk on the Lady Bell and Big Blue mines; work

is also being done on the Mammoth and Capital mines.

Work is going ahead on the canal for the Electric Power & Development Co. The company is importing many Japanese for the rough work. Mojave Indians were employed for some time, but drop out, as the work is too hard for them. There are 300 men working on the canal. The company is paying generally \$2 a day for top work, for surface blasting \$2.50 and for tunnel work \$3.

LOS ANGELES COUNTY.

Iron ore 3½% titanium is reported by the American Iron Co. at Russ Station, in the Soledad, near Saugus. The manager says the ledge is 800 feet above the company's smelter at Russ Station, with gravity haul. The first run of the plant has already produced a number of pigs of good-looking iron. Oil and charcoal are used for firing the smelter. The lime rock comes from Tehachapi and costs \$3 a ton, laid down.

NEVADA COUNTY.

Work on the Brunswick mine has resumed.

At the Conlin mine Superintendent O'Connor has cleared the old tunnel leading into the Lafayette mine. Where the entire works were destroyed by fire new buildings have been completed. The hoist and pumps will be in operation next week. At present the company will not build a mill.

L. R. Poundstone is manager and J. L. Gluyas foreman of the California, or Gaston Ridge, mine, between Washington and Graniteville, altitude about 5000 feet. A tunnel is in 2800 feet. The 8-foot ledge is low grade. Everything mined is crushed in the 30-stamp mill; capacity, 150 tons per day. Motor power is furnished under a pressure of over 300 feet. The mine employs fifty men.

Superintendent A. D. Gassaway, at the Union blue gravel mine, North Bloomfield, for thirteen months has been driving a tunnel to reach the channel; it is now in over 5000 feet. A small locomotive is used for hauling the rock and earth from the tunnel. About fifty men are employed.

Superintendent Ralston, at the Gold Blossom mine, will put in a pumping plant. A 10-stamp mill, hoist and other machinery will be installed.

The Gold Tunnel M. Co. have their stamp mill completed and report it doing good work.

F. Enzensperger says the Red Cross mill will be ready to operate Jan. 1.

SAN BERNARDINO COUNTY.

C. H. Thompson and the estate of A. G. Campbell have given an option on the Brick Con. group of mines, near Vanderbilt, to the Federal G. M. Co., which will require \$720,000 for the purchase and development of the properties.

SHASTA COUNTY.

Hartwig A. Cohen, general manager of the De Lamar interests, tells the Salt Lake Tribune that the sale of the Bully Hill has not been completed, but that everything is favorable to it under the option which was recently granted by the owner.

The Redding G. & C. Co. has bonded the R. B. Read and Oliver LaPlant properties at Keswick. The Read property consists of two mines—the Gold Quartz and the Dipper—both producing properties; price \$10,000. The LaPlant property is the Clary mine and Cascade Nos. 1, 2 and 3. Men will put in a hoisting plant; a 350-foot shaft will be sunk on the Read mine.

B. F. Rodgers, superintendent South Fork mine, has men cutting 45 feet of tunnel a week and is nearing the main tunnel.

Superintendent W. W. Adams will resume work on the Balaklala mine this week.

TUOLUMNE COUNTY.

(Special Correspondence).—At the Lost Fox mine, 20 miles above Carters, the new 20-stamp mill is completed and within ten days Superintendent Ingalls expects to be crushing rock. Steam power will be used at present, but a 6-mile ditch is planned by which water will be brought from Bear creek, giving a fall of 800 feet, and a continuous supply the year round. The shaft is down 200 feet, and at this depth there is a 7-foot ledge of good ore. Thirty men are employed. The mill at the Hunter mine is in operation.

Sonora, Nov. 3.

A strike is reported in the 560 level of the Confidence mine in an upraise.

The Columbia Marble Co. have a 60 H. P. traction engine. There are in addition to the engine three freight wagons of ten tons capacity each, also one oil and one water wagon.

At the Harvard mine No. 1 shaft is timbered 650 feet down; the 700 level will be reached next week, when sinking will be continued.

TRINITY COUNTY.

Superintendent Porter of the Fairview mine, near Minersville, tells the Journal

that the new 10-stamp mill has been started up and works well. The tramway conveys enough ore in an hour to feed the mill for a day, each car having a capacity of 1000 pounds. The ledge is strong, well defined and rich in free gold. The property is a valuable one and improves as work progresses. About sixty men are employed.

COLORADO.

BOULDER COUNTY.

(Special Correspondence).—The B. & M. mine at Ward is being worked by lessees. Last month they shipped thirty-two tons of ore, averaging \$50 per ton, and will soon ship a carload per week. The mine has a 10x10 hoist and 6 drill compressor. The shaft is down 900 feet. Ten men are working. Contractors are building a shaft on the B. & M. lead No. 2 to develop it and adjacent properties.

The Newmarket mine at Ward is doing development work at present, driving west at the 500-foot level for the croppings of a big ore shoot. The mine is not shipping at present. The incline shaft is on a pitch of 19° down 505 feet, with levels 150, 250, 300, 400 and 500 feet. Smelting ore runs from \$10 to \$150 per ton. Milling ore \$7 to \$12. A 10-stamp mill is connected with this mine. The Quickleyville mill water power runs the mill eight months in the year. The mill has the record of making good saving. G. A. Kilne is the owner and manager of the mine. Next month, when development work is finished, he will put on more men and start shipping ore.

The Oronogo G. M. & M. Co. at Ward, W. E. Meade manager, is building a shaft house and putting in a 60 H. P. steam hoist, boiler and air compressor to sink a shaft 1000 feet deep. They have six claims 1 mile from town on Oronogo hill, and have developed three veins on the property and will sink two of them. They will sink one shaft at the east end and one at the west end of the property and connect the two at the bottom, which will develop the hill and give ventilation.

The Giles G. M. & M. Co. in Spring gulch, Ward, are carrying on development work at its 500-foot level, drifting toward a chimney of ore 300 feet wide showing small veins of gold bearing ore. On the surface this chimney shows good cyanide and free milling ore. They are unwatering a shaft sunk on the property by the former owner. This company has thirty acres in one body.

The New Morning Star M. Co. in Spring gulch, Ward, J. E. Lee superintendent, have a bond and lease on the property. The have four claims—Morning Star, Emma Lena, Evening Star and New Morning Star. There are several leases at work on this property. Last month they shipped thirty-six tons of mill dirt and smelting ore. The smelting ore averaged 5 ounces in gold and mill dirt \$15 per ton. The company is doing development work exclusively. They are figuring on putting in a new compressor. They have the main shaft down 300 feet and are sinking with steam drills. They have two shaft houses and two hoisters on the property.

Ward, Nov. 1.

(Special Correspondence).—Andregg, Bean, Hubbard & Hendricks have a lease on the Wood Mountain mine and mill at Wallstreet and are handling from twenty to twenty-five tons of ore per day through the mill. During the month of October they were drifting in the mine, but kept the mill running steadily. They are taking ore from the winze. The milling ore, which is from 5 feet to 15 feet wide, will average \$10 per ton. They have small streaks that will run as high as \$60 to the pound. The mill is concentration and amalgamation. On account of the scarcity of water they are only running the water wheel at night to supply the mine with air.

George A. Blaisdell, manager the Gold Lode mine at Wallstreet, is working two shifts sinking the shaft down to 500 feet. It is now down 300 feet. Putting an upraise through from the 100-foot level which will give them good circulation. Has two bodies of ore. The main body is about 26 inches wide and runs from \$22 to \$24 in carload lots. Has a high-grade streak that will go from \$160 to \$230 per ton. Has the mine equipped with a 6x8 hoist and 30 H. P. boiler.

At present the Lucky Star mine at Wallstreet is doing development only. The shaft is down 425 feet.

The Nancy G. M. & T. Co. at Wallstreet have their tunnel in about 1250 feet. At a distance of 1050 feet they struck the Gillard vein. They are now upraising in the breast of that level to connect with the shaft on the hill. They are now within a few feet of making connections. Are shipping about two car loads of smelting ore per month, but the main body of the ore they are now taking out is milling ore which they are piling up waiting for the completion of the mill at Wallstreet.

The vein they are at present working on is called gray copper. They have about 400 feet of stope just completed and are ready to take out ore. Are starting a stope on the Last Chance vein. Are sinking on the Gillard shaft. Have between 400 and 500 tons of ore on the dump waiting for the mill to start up. Milling ore runs about \$15 per ton, smelting ore about \$50 per ton. They expect to build a short tramway from the mine to the mill later on. S. G. Knott is superintendent, W. M. Mitchell, foreman.

Ralph Cotton, manager of the Hidden Treasure mine, Wallstreet, is sinking a shaft 100 feet and will run levels from this point. Everything is looking favorable for a good mine, and if same turns out according to expectations they will install a hoist and other machinery necessary for the operation of the mine.

The Old Wallstreet tunnel at Wallstreet has just been started up by the Mile High M. & M. Co. of Denver, composed of mail carriers. The tunnel is in 400 feet. They expect to run same to cut the Tomboy lead, which is about 200 feet more. A. J. Matt has charge of the work.

At Sugar Loaf, where they grow gold in potato patches, I interviewed W. B. Teters, who stated: "The width of the ore vein is from 6 to 8 feet. Shipping ore runs from \$15 to \$10,000. We shipped some without sorting that run 300 ounces in gold. By the car load it has run eight or nine ounces in gold without sorting the bulk ore. Up 1500 feet on the same vein we cleaned out an old crosscut on the Sphinx and took samples. The samples run as follows: No. 1, \$39.60; No. 2, \$70; No. 4, \$488.96 per ton. We went 30 feet west of that, cut a vein and got a sample that run \$11.60. The vein is 43 feet wide that runs from \$11 to \$500 per ton. In places the ore was taken out 28 feet wide. There is a shaft down 200 feet and assays taken all the way down shows ore." They are taking out the rich ore on the side of a hill, a trench about 30 feet deep by 15 feet wide and probably 12 feet long; they also have a shaft down a few feet where they are taking out the best ore. The ore taken out from the trench is milling ore. The flod mentioned above is on the ground belonging to the Livingstone, a short distance from the main shaft of the Livingstone, and was discovered by a man while plowing a few weeks ago.

J. G. Wood of Salina has a lease on No. 3 of the Little Johnnie group and is taking out some very fine ore—some running as high as \$10 per pound. The tunnel is in 425 feet. The ore he is taking out is about 100 feet from the breast of the crosscut. The streak of ore is from 6 to 8 inches in width.

Wallstreet, Nov. 5.

(Special Correspondence.)—The Tripp Reduction Co., Ward, on the Sao Blas property, is overhauling the mill. The Tripp process will be used. Part of the ore is free millage. They have a 20-foot vein averaging \$5 per ton; are crosscutting for high-grade vein and expect to strike it at 300 feet depth. Dr. Dillingham is superintendent.

The Boston mill at Puzzler, Ward mining district, is being operated by P. H. Shue & Co. They have a centrifugal slimer. The treatment is different from ordinary. Following the plates or battery first is a classifier, which separates the heavy pulp from the water containing the slimes. The pulp is taken through the usual table process, the water of the pulp run through the centrifugal slimer, a percentage of the higher gravity slimes taken out. In cutting out these slimes in such a quantity of water they conform to the usual concentration and chemical process. The mill contains forty stamps, but they will use but twenty stamps. The system which they will employ will increase the table capacity.

The Ward Rose M. Co. at Puzzler, Puzzler gulch, will sink 500 feet below the tunnel level, now 430 feet, by contract. The mine has a good shaft house, tunnel house below, a 10x12 hoist, two 40 H. P. boilers, three-drill compressor; do all of their work with machioe drills except stoping. The ore averages five to eight ounces in gold. They have no use for a mill as their ore is mostly a smelting ore; have twenty-two claims, two mill sites. All of the twenty-two claims can be worked through the tunnel. A. R. Donaldson is manager.

The Success group of claims on Saw Mill hill at Puzzler is owned by W. M. Coleman, who is putting the property in shape for operation. There has been about \$16,000 expended on the claims in the way of improvement. He has two leads opened up which shows ore that will run \$30.

Camp Brainard at Ward shows a fine stone power house 40x30 feet, containing 125 H. P. dynamo, Westinghouse type, four 38-inch Leffel water wheels, four-drill compound compressor. The compressor is made to run with either steam or water, or both together. The power plant furnishes electric lights for the

mioes, boardiing-house and residence. W. Brainard is manager. They are only operating in the Alaska tunnel at present, now in 2000 feet.

Suonet, Nov. 1.

The Nancy Co. projects an electric tramway from and through the Nancy tunnel to the ore bins of the Wall Street G. E. Co., a distance of 3000 feet.

CHAFFEE COUNTY.

A. Tetrault of Turret has a new stamp mill, 1000-pound stamps dropping at the rates of 100 times per minute.—The new machinery for the Vivandiere mioe at Turret is being set up. Sinking below the 500-foot level is resumed. The old machioery will be set up at the Gertie.

The Washington mioe at Granite has been closed down for a short time, but is expected to begin again November 15. The company will hoist ore to be treated at the Magenta mill.

The St. Joseph M. & M. Co., recently acquired by the Colorado Sureties Co. and owning property adjoining the Washington, is preparing for extensive development work.

CLEAR CREEK COUNTY.

The Clear Creek M. & Dredging Co. will resume placer mining near Idaho Springs upon a considerable scale.

Near Silver Plume an ore shoot on the Seven-Thirty & Bismarck group, in the west drift on the tunnel level, assays 250 ounces silver and 1½ ounce gold.

Louisini & Co., lessees on the Pelican Dives, during the past week shipped one wagon load which gave a mill return of \$3027 and another which brought \$1000.

J. H. Robeson, going westward in both drifts on the Burleigh tunnel, has medium grade ore in the Phillips lode.

In the Seaton mine Manager Goldsmith reports 8 feet of pay ore in the ninth level on both sides of the shaft winze. The raise put through from ninth to eighth has also opened up a solid streak of smelting ore 4 feet wide and running \$60 a ton.

L. Bonham, general manager Pontiac G. M. Co., will develop a tunnel site and other claims in the East Argentine district. The company will run a tunnel 4000 feet through McClellan mountain.

Idaho Springs reports a deal in Lower Clear Creek, where the Con. Gem M. Co. buys 2 miles of vein within the Newhouse tunnel. W. E. Renshaw, one of the owners of the Gem mine, interested Eastern capital, with the result that almost \$3,000,000 changes hands. In the group turn-over was the Franklin and Silver H. groups, recently consolidated, and belonging to the Franklin Con. Co.; also, the Freighters' Friend, belonging to W. E. Renshaw. In all, over 100 claims were included in the consolidation. In addition to the working mines, with their compressors and plants, several mills were included; among these were the Newton concentrator, capacity 100 tons per day; the State ore mill, opposite the Newton, and the Silver H. mill, below Idaho Springs. An interest was also acquired in the Seaton Mountain E. L. H. & P. Co., which owns two plots—one in Idaho Springs, the other 3 miles below; also, several miles of water rights on Clear Creek.

The Pontiac G. M. & T. Co. is incorporated to drive a tunnel through McClellan mountain, in Argentine district, 3500 feet in length, beginning on the eastern slope and driving through toward Grey's peak.

Manager Marshall, of the Marshall-Russell Co., at Marshall park, in a 400-foot tunnel, has cut the seventh vein and the sixth blind lode. A new vein shows 3 feet of \$8 sulphide ore, with 8 feet of quartz. A steam plant will probably be installed as an auxiliary of the water power.

GILPIN COUNTY.

The Ingalls G. M. & L. Co. has incorporated; W. R. Benzie, W. H. Haven, J. M. Sbrote, P. E. Richter, J. E. Hunter. The company is operating the Ingalls mine, Quartz hill, and arrangements are being made to sink the shaft a further depth of 200 feet.

During the third week of October the shipments of smelting and crude ore, tailings and concentrates from the Black Hawk depot to the Golden and Denver smelters and to Idaho Springs points were 101 cars, or 1020 tons, bringing the total for the month to that date to 309 cars, or 6180 tons.

A new cable 1500 feet in length has been received for the Delmoioe property on Quartz hill. Sinking is being carried on with three shifts. The shaft has about reached the 1000-foot depth, but will continue to 1400 feet. There is good ore showing in the shaft as well as in the 800-foot level.

At the Alps mine in Nevada district stoping and upraising are being carried on between the fourth and fifth levels and enough millage ore is being hoisted to keep one battery of stamps dropping at the Gilpin mill at Black Hawk. The les-

sees are also taking out smelting ore which will run from five to six ounces gold per ton, and employment is being furnished to fifteen men, with double shifts.

The Golden smelter, operated by the Clear Creek M. & R. Co., has taken off from its smelting charges the penalty for silica on all ore not running over \$15 per ton, the charges to remain the same for excess silica on all ore above that value.

Denver men have a lease and bond on the Straub mine on Gunnell hill and have commenced sinking.

Near Central City, the Kansas-Burroughs Con. M. Co. will sink their Phoenix-Burroughs shaft another 100 feet, which will give it over 1400 feet depth.

GUNNISON COUNTY.

Superintendent R. W. Spensley of the Dora has been doing extensive work in Union park, in the Tin Cup district, of a preparatory nature. Besides this, a ditch of 3 miles has been made to secure water for hydraulic pressure, furnishing a fall of 120 feet. This season the last 400 feet of flume work was completed. A half mile of solid bedrock had to be blasted out in coming up Loties canyon with the flume.

LAKE COUNTY.

Leadville reports that the new shaft of the Boulder M. Co., in Big Evans gulch, north of the Big Six, has shown improvement. At a depth of 170 feet it was decided to commence drifting, and a fissure has been cut which gives assays of one-half ounce in gold.

The Moyer is shipping 100 tons per day of zinc ore, most of which is obtained by hand sorting. The material is now being shipped to the Lanyon Co.'s works at Gas, Kan.

At Sugar Loaf the Orinoco, Gunnison and Fanchon are all taking out mineral.

T. S. Wood of the Greenback mine states that thus far the owners have not made any contract for their ore, but that there is a possibility of an arrangement being made, whereby the property can resume. As to the value of the Greenback ore to the lead smelters, it is a clean iron sulphide. Extensive developments at various levels have demonstrated the existence of ore reserves sufficient, Mr. Wood states, to keep a smelter running for twenty years.

In the Progressive shaft on the O. K., Manager Cooper has data furnished by the shaft which shows conditions as follows: Wash, 30 feet; lake beds, 75 feet; soft coarse-grained gray porphyry, 45 feet; white talc, 4 feet; soft coarse-grained porphyry, 13 feet; yellow talc, 3 feet; soft gray porphyry, 23 feet; hard white porphyry, 14 feet; sulphide contact, containing buoches and streaks of sulphide ore, 9 feet; blue lime, 21 feet; yellow talc and carbonate ore, 2 feet; hard and soft dolomite, 29 feet; soft and hard carbonate, 1½ feet; carbonate contact, 10½ feet; black flint, 13½ feet. This would give about 100 feet of porphyry overlying the blue limestone, a condition generally in the mineral bearing portion of the camp. The contacts show the ore to be thus far low grade, four or five ounces of silver and .06 of an ounce in gold.

LARIMER COUNTY.

The Bonbright group of mining claims north of Pearl, four claims, has been sold by its owner, John Drew, to a Pennsylvania company, consideration \$4000 cash and 200,000 shares of stock. The Bonbright group adjoins the State Line group.

MONTROSE COUNTY.

R. G. Hall, former manager American-Nettie mine and mill, M. Atkins and W. Kountz are at Cashin, where they have a bond and lease on the La Sal copper mines and smelter.

SAN JUAN COUNTY.

The Ledger M. & M. Co. has started its new \$100,000 stamp mill at the property at Chattanooga. The old mill was destroyed by fire last fall, since which time the company has been replacing it with an up-to-date and enlarged equipment consisting of a 200-ton mill, new shaft house and machinery. The company has developed a power from one of the adjacent streams sufficient to supply a mill double the capacity of the one which they are operating.

SUMMIT COUNTY.

H. H. Nicholson, in Breckenridge, expects to have the Hamilton rapid-drop 10-stamp mill running on good ore from the Hamilton group, Summit gulch section.

The Augusta Co. has temporarily suspended mining on the Juventa property at Lincoln. The Journal says the company, through T. R. Griffith, has expended between \$60,000 and \$70,000 in prospecting in that camp.

TELLER COUNTY.

The Pharmacist Co. will install cages in its main workings to facilitate handling increased tonnage of ore by lessees.

Cripple Creek district October output was 56,100 tons, which yielded \$2,008,800. The table for October is as follows:

	Tons.	Av.	Total.
U. S. & R. R.	15,000	\$29	\$ 435,000
Telluride	2,000	30	60,000
Union	10,400	32	332,800
Dorcas	2,800	30	84,000
Arequa	1,000	10	10,000
Economic	5,400	30	162,000
Portland	7,000	25	175,000
Smelters	12,500	60	750,000
Totals	56,100	\$31	\$2,008,800

The following table shows the dividend-paying mines of Cripple Creek district with the last dividends and the totals to date:

Acacia—Last dividend, 1 cent, \$15,000, paid December 15, 1900. Total to date, \$45,000.

Butterfly-Terrible—Dividend of ½ cent, \$6250, paid October 23, 1901. Total paid to date, \$31,250.

United Gold Mines—One cent monthly. Dividend of 1 cent, \$40,090.69, paid October 5, 1902. Total paid to date, including Consolidated Mines and New Zealand, \$955,933.45.

Doctor-Jack Pot—One cent monthly. Dividend of 1 cent, \$29,000, paid August 29, 1901. Total to date, \$232,000.

Elkton—Four cents quarterly. Dividend of 1 cent, \$29,000, paid August 29, 1901. Total to date, \$1,404,460.

El Paso—One cent quarterly. Last dividend 1 cent, \$24,250, paid December 20, 1901. Total to date, \$24,250.

Free Coinage—Dividend of 12 cents per share, amounting to \$120,000, paid in September.

Gold Coin—Decreased to 1 cent monthly. Last dividend 1 cent, \$10,000, paid October 15, 1902. Total paid to date, \$1,180,000.

Gold King—Three cents quarterly. Last dividend 3 cents, \$23,105.50, paid July 20, 1901. Total to date, \$272,421.50.

Golden Cycle—Paid 10 dividends to September 25, 1902, \$2,332,050. Pays monthly ½ cent, or \$11,250.

Ingham—Dividend of ½ cent, \$2425, paid August 28, 1901. Total to date, \$30,700.

Isabella—Pays quarterly, various rates. Last dividend 1 cent, \$22,500, paid March 23, 1900. Total to date, \$742,500.

Jack Pot—Pays at irregular intervals. Last dividend, 6 cents, \$75,000, paid December 23, 1899. Total to date, \$150,000.

Katinka—Paid first dividend of \$10,000 in October.

Last Dollar—Two cents quarterly. Last dividend 2 cents, \$30,000, paid October 21, 1901. Total to date, \$150,000.

Mary McKinney—Three cents quarterly. Last dividend 3 cents, \$30,000, paid October 10, 1901. Total to date, \$480,000.

Modoc—Two cents quarterly. Last dividend 2 cents, \$10,000, paid April 15, 1902. Total to date, \$310,000.

Nugget—Last dividend of 1 cent, \$9910, paid July 19, 1901. Total to date, \$30,600.

Pharmacist Cons.—The old Pharmacist Co. paid a total of \$84,000 dividends in the early days of the camp.

Pointer—Dividend of 1 cent, \$12,500, paid June 1, 1901. Total to date, \$25,000.

Portland—Six cents quarterly. Last dividend 3 cents, \$90,000, paid October 15, 1902. Total to date, \$4,297,080.

Stratton's Independence—Dividend of 20%, \$241,000, paid in October, 1901. Total to date, \$3,553,885.

Vindicator—Three cents quarterly. Last dividend 5 cents, \$55,000, paid July 25, 1902. Total to date, \$862,000.

Zoe—Dividend of ½ cent, \$7500, paid December 25, 1900.

In Cripple Creek district there are 5217 men employed in the mining industry. The monthly payroll amounts to \$528,899.71. Battle mountain employs 1685. Bull hill ranks second, 1531 men being employed. The total of 5217 men are employed at 255 different places, showing that to be the number of properties now being worked. The large number of men employed on Battle mountain are distributed among thirteen different properties, giving that section the highest average of men to a property also. The smaller number of men on Bull hill are divided among thirty-seven properties.

Victor hears that the War Eagle strike is unusual, that the lessees have already taken out \$40,000 worth of ore in going down 40 feet, and are shipping the entire vein which is 15 feet wide and averaging \$25 a ton. The property is being worked by the War Eagle M. & L. Co., who have a three years lease at 10%. A production of 500 tons a month is being maintained entirely from the development work done in sinking the shaft.

There has been much speculation as to the policy the administrators will pursue with reference to the mining interests which the late W. S. Stratton had in Cripple Creek. It is stated that the mining properties lying outside of the claims now being operated by the company will be worked by lessors. It will be the

policy to open a number of the properties to leasers, although the ground in the immediate vicinity of claims being worked by the company will probably not be leased, nor will leases be given on any of the dumps. Over 200 applications for leases have been received at the offices of the Stratton-Cripple Creek Development Co. No leases will be granted, however, until some other matters have been disposed of.

If the laboratory tests hold good on a commercial scale with the treatment of the ores of the Ironclad mine, by the cyanide process, the ore as hoisted can be broken, hoisted and treated at an average cost of \$2 per ton and an extraction of from 85% to 90% of the gold contents obtained. The ore is oxidized and so loose between walls that it requires no powder to get it out. For that reason, it is locally figured, the cost of breaking and hoisting will be but \$1 per ton. As no roasting is required, it is figured that the cost of treating the ore will be another \$1 per ton. On ore averaging \$4 per ton in values there will be saved \$1.20 in gold above mine and treatment charges. A new hoisting plant of machinery is to be purchased for the shaft.

IDAHO.

ADA COUNTY.

Boise reports discovery of gold in the Black Hornet district. On the hanging wall is a streak of talc; next lies 14 inches of rich gold ore, then about 4 feet of ordinary ore.

BLAINE COUNTY.

The Halley Times says: At the Minnie Moore mine a 3 foot vein of solid galena flanked by some feet of concentrating ore was tapped last Saturday, by crosscut from the shaft on the 1000-foot level. The old mill may be discarded and a new one of much greater capacity constructed.

Martin reports another free-gold strike in that camp by J. B. Hood, values from \$25 to \$200 per ton, 2 miles from the Mayflower mine. Ground is being rapidly staked off.

CUSTER COUNTY.

At Stanley Basin Manager Burroughs and Foreman Greene intend to have the dredger in operation this fall. It is being rebuilt on new principles. Only a short flume will be used. The gold saving will be done principally on a series of shaking tables. The tailings will be taken away by means of elevators. Forty men are employed at the Valley Creek mine. The mill will be crushing ore by Jan. 1.

IDAHO COUNTY.

At Buffalo Hump three mills are operating on gold ore, the Big Buffalo, Crackerjack and Jumbo. Other claims doing development work are the Baby Louise, Atlas, North Pole and Combination. There are about 300 men on the payrolls of the different mines.

The district is within the confines of the Bitter Root forest reserve, but timber is scarce. Cordwood is \$6.50 per cord. Lumber is difficult to obtain at the prevailing price of \$40 per thousand.

The tramway at the Wise Boy mine is completed and will start next week.

The Clackamas G. M. Co. has started work on the Rob Roy and Australia claims.

ROOTENAI COUNTY.

Near Tyson the Cœur d'Alene Dredging Co. has bonded and purchased outright large holdings of placer ground for \$14,000 and will construct a dredger. The ground has been prospected and pay dirt going from 1 to 14 cents to the pan found in all parts.

The Tyson Con. M. & M. Co. has been organized. F. W. Haverland, manager; C. Toppings, superintendent. This company owns some quartz claims in the camp. The War Eagle is the most promising claim. It adjoins the Richmond, on the east. The company will put in thirty stamps.

The Homebuilder M. Co., in the Wolf Lodge district of Cœur d'Alene, has men developing the eight quartz claims. It is the intention of the company to install machinery for operating the mine.

OWYHEE COUNTY.

Connection was made last week between the Florida mountain tunnel, from Dewey, and the shaft sunk from the workings in the Trade Dollar mines above. The tunnel is the result of three years continuous work; is 7020 feet long from its mouth to the point where the connection was made, and 1700 feet under the summit of the mountain. The Nuggets says: Eventually the ores from the mines will go out through this tunnel to the Florida mountain mill at Dewey, and the work of milling the ores will be more centralized at Dewey, where the main office of the company is located. A circulation of air coming in through the tunnel was at once established.

SHOSHONE COUNTY.

P. Burke is superintendent Park mine,

5 miles from Mullan. A tunnel has been run on the property 1000 feet long, which pierces a 20-foot lead. It runs 8% copper.

C. S. Cryser of the dredge companies of Delta has bonded the Wake-Up-Jim gold-producing property at the head of Trall gulch, 3 miles from Delta, for \$50,000; cash payment, \$2000; second payment, \$35,000, Feb. 15, 1903; third payment, \$13,000, April 1, 1903.

Work on the dam across the Cœur d'Alene river at the mouth of Pine creek, 7 miles below Wardner, to keep the tailings from the concentrators from flowing down the river and into the lake below, has begun. It is expected that it will retain all the tailings which might flow down the river for the next ten years. As the tailings contain values \$2 per ton it is thought that ore retained by the dam might be worked over when finer machinery is invented to treat such low-grade ores.

MONTANA.

BROADWATER COUNTY.

The Corbin concentrating people have leased the waste dumps of the H. & H. mine at Winston.

CASCADE COUNTY.

At Great Falls J. J. Hill will arrange for the transformation of an old silver smelter of the American Smelting & Refining Co. into an iron and steel mill.

FERCUS COUNTY.

J. H. McCormick, superintendent Gold Reef mines, Gilt Edge, says the treatment of the black ores of those mines is proving satisfactory, a large per cent of the values being recovered.

GALLATIN COUNTY.

The International M. Co., by S. J. V. Henderson and E. A. Bradley of Bozeman, will develop a group of mines near Spring hill.

JEFFERSON COUNTY.

The Helena Livingston Co. has bonded the Mullers mine, west of Corbin; purchase price, \$16,000. Men have been put to work.

LEWIS AND CLARKE COUNTY.

A new road has been built from Silver Camp, in the northern portion of the county, to Wolf creek, which shortens the wagon haul 16 miles. At Silver Camp the ores are mostly base, silver-lead, some of which carry gold. At Copper Camp are found high-grade copper ores. Above the town of Lincoln is an extensive mining district, having leads containing free-milling gold ores, some of which are rich.

MEAGHER COUNTY.

W. W. McDowell of Copperopolis, lessee and manager of the Marcus Daly copper mines, says that a crosscut is being run on the 400-foot level toward the ore body, which was worked above the 300-foot level. This mine has produced considerable high-grade ore, running 50% copper.

PARK COUNTY.

A. Livingston is receiver for the Bear Gulch M. Co., Jardine. Work on the new mill is going forward.

T. Shiels, at Cooke, has the Silver Queen, Como, Puck, Silver Zone No. 2 and Maria L on Henderson mountain. On the Como a body of ore has been exposed.

NEVADA.

LINCOLN COUNTY.

The Quartette M. Co., operating at Searchlight, reports a net haulion yield for the quarter ended September 30th of \$11,733, the tax on which is \$375.

The Bamberger-De Lamar Co. at De Lamar figure on having their mill in operation in January. Power is to be derived from Meadow Wash, 15 miles, water being piped to the plant. The new mill and power plants will cost about \$250,000. It is expected that a great saving in expense will be effected. It is estimated that 100,000 tons of ore are in sight, averaging \$10 per ton.

The Chiquita mine, Searchlight, recently bonded, has a streak of ore in a 4 foot lead 15 inches wide, running \$100 per ton.

NYE COUNTY.

(Special Correspondence).—Jno. Hays Hammond had twelve men working here under his personal supervision last week. Everything looks well. Herewith is supplied the exact facts as to the present development work being done in Tonopah: Tonopah Old Co., new shaft, three compartments, 40 H. P. hoist, depth of shaft 420 feet; Valley View, three-compartment shaft, 22 H. P. hoist, depth of shaft 300 feet; Wandering Boy, two-compartment shaft, 22 H. P. hoist, depth of shaft 490 feet; Stone Cabin, two-compartment shaft, 12 H. P. hoist, depth of shaft 225 feet; Gold Hill, two-compartment shaft, 40 H. P. steam hoist, depth of shaft 200 feet; Fraction No. 1, two-compartment shaft, 12 H. P. hoist, depth of shaft 240 feet; Fraction No. 2, two-compartment shaft, 30 H. P. hoist, depth of shaft 500 feet;

North Star, two-compartment shaft, 22 H. P. hoist, depth of shaft 380 feet; Montana Tonopah, two-compartment shaft, 34 H. P. hoist, depth of shaft 200 feet; Mizpah Extension, two-compartment shaft, 12 H. P. hoist, depth of shaft 500 feet; Ohio Tonopah, two-compartment shaft, 30 H. P. steam hoist, depth of shaft 270 feet; Tonopah Tunnel Co., two-compartment shaft, 44 H. P. hoist, depth of shaft 240 feet; Belmont, two-compartment shaft, whim hoist, depth of shaft 250 feet; Halifax, two-compartment shaft, whim hoist, depth of shaft 240 feet; Little Tonopah, two-compartment shaft, 12 H. P. hoist, depth of shaft 60 feet; Zenith, two-compartment shaft, whim hoist, depth of shaft 70 feet; West End, two-compartment shaft, whim hoist, depth of shaft 230 feet; McNamara (Tonopah Con.), two-compartment shaft, whim hoist, depth of shaft 200 feet; New York Tonopah, two-compartment shaft, 22 H. P. hoist, depth of shaft 200 feet; California Tonopah, two-compartment shaft, whim hoist, depth of shaft 120 feet; Tonopah City, two-compartment shaft, 22 H. P. hoist, depth of shaft 170 feet.

There are a number of other companies just starting work, among them being the North Tonopah G. M. Co., Boston Tonopah M. Co., Midway M. Co. and a number of others. The ore bodies in the various mines in the camp are claimed by the owners to be satisfactory in the lower workings. The movement of high-grade ore continues to the railroads, and the indications are that it would take the several hundred animals now engaged in hauling some months to complete the task. The town is rapidly building up and the incoming stage is loaded to the guards. The present population is about 4000.

In the outlying districts there is but little development work being done at the Wepah district. There are large quantities of fair-grade ore in sight. The Alpine district is turning out well. Lynch & Omera have recently bought a claim for \$10,000 cash and are shipping ore now running about 50% lead, 180 ounces silver and \$9 in gold. This new camp is situated on the west side of Lone mountain, about 25 miles from Tonopah toward Candelaria. There has been some recent discoveries made on the south side of Lone mountain, and 4 miles from Silver Peak salt marsh. These ledges seem well defined and run high in gold and silver. H. C. Cutting owns most of the good claims in the new section. At Silver Peak the crosscutting work on the Silver Peak mines has been discontinued by the Colorado people who have it under bond. It is not known at the present writing whether the Denver people will take this property or not.

Tonopah, Nov. 3.

STOREY COUNTY.

The face of the Sierra Nevada and Union Con. joint east crosscut from the station on the 1600 level of the Union shaft is still in hard porphyry. The crosscut is out a total distance of 68 feet. The winze in the north drift from surface tunnel No. 2 in the Utah Con. mine is down 26 feet. The bottom is in quartz and porphyry.

On the 425 level of the Gould & Curry mine east crosscut No. 2 from the north-westerly drift is in 37 feet. The face is in very hard quartz, giving low assays.

WASHOE COUNTY.

The Silver City M. & D. Co. has been incorporated; H. L. Slosson, H. J. Hechtman, M. Fleishacker, F. H. Beck, L. Greenbaum, P. H. Flanagan, H. Fleishacker, J. H. Kinkead, L. Schwabacher.

WHITE PINE COUNTY.

B. S. Frost has bought the Wide West mine, Cherry creek.

NEW MEXICO.

GRANT COUNTY.

J. P. Deming of Silver City will put in a copper leaching plant to treat the ores from his mines in Burro mountains, where he has about thirty claims.

The Comstock No. 1 mining property, four claims, Shakespeare district, near Lordsburg, owned by C. Yeager, has twelve men developing. A large body of ore has been exposed and gives \$28 in gold, 6 1/2 ounces silver, 21% lead.

J. C. Woodward, who is getting out considerable rich ore at his Casino mine at Bald Mountain, is shipping to the El Paso smelter.

SOCORRO COUNTY.

The Graphic mine at Kelley has again been leased by A. B. Fitch of Magdalena. A concentrator is being built to handle the zinc-lead sulphide ores.

VALENCIA COUNTY.

At Santa Fe, the Eastern Railway of New Mexico is incorporated for the Atchison, Topeka & Santa Fe cut-off from Mexico, near the New Mexico boundary, to Rio Puerco. It will go through Aho Pass, cross the Rio Grande at Belen. It will be 265 miles long and will be the connecting

link for a direct east and west line from Kansas City to Los Angeles. Two branch lines were incorporated at the same time—one from Rio Puerco to Aho Pass, 55 miles long, crossing the Rio Grande at La Joya, and a cut-off from Brazil Springs by way of Portales into Texas, to connect with Fort Worth and Galveston, giving a direct line from San Francisco and Los Angeles to Fort Worth and Galveston. This cut-off will be 65 miles long in New Mexico.

OREGON.

BAKER COUNTY.

Near Bourne, Superintendent J. W. Gray of the Esmeralda G. M. Co. has men working on the property at the head of Big Cracker creek. He expects to employ fifteen men in development work, with the intention of constructing a mill in the spring.

Sumpter says that Mohr & Roe, who located two claims near the Cracker-Oregon a few months ago, have sold their holdings to that company for \$35,000.

The Aurora G. M. & M. Co., operating the Perry and Rachel mines east of Baker City, have closed down to put in new machinery for deep mining. W. W. Watson is superintendent.

The Lucky Boy G. M. Co. has incorporated at Sumpter; A. P. Jones, E. E. McCammon, S. R. Stott, incorporators.

GRANT COUNTY.

The Potosi group, Orphan Boy group and Golden Gate group of mines in Grant county, in the Red Boy and Greenhorn districts, will be operated under one management, the United Exploration Co.; president, L. Auorbach, who is secretary and treasurer of the Trinity mine, California.

JOSEPHINE COUNTY.

At the Eureka mine on Soldier creek Manager de Varilla has the 10-stamp mill in operation.

Superintendent Thompson, at the Greenback mine, on Grave creek, is putting in a new 20-stamp mill. The old mill, Greenback mountain, will be reduced to five stamps during the winter and will be used as a custom mill only.

Grant's Pass figures that the output of placer and quartz gold from the mines of southern Oregon for 1902 will be 45% greater than it was last year. The total output last season of the mines of Josephine county was \$1,054,200. This year it is expected to be \$3,000,000.

Six-horse teams are hauling machinery for the new 20-stamp mill of the Greenback mine on Grave creek. The Greenback produces from \$23,000 to \$30,000 monthly.

LANE COUNTY.

F. E. Sharkey reports a strike at his Lucky Boy mine of free milling ore "as good as anything in the Blue River district."

PENNSYLVANIA.

SCHUYLKILL COUNTY.

The coal strike commission has ended its tour of observation of the coal fields. The members of the party will meet at Scranton on the 14th inst. to take the testimony of the miners. The commissioners made a complete investigation of two collieries and the region lying between Mount Carmel and Berlin. Six days were consumed in traveling in the anthracite coal regions and the arbitrators feel that they are now qualified to sit in judgment on the controversy between the mine employers and their employees. The commissioners were lowered into mines of varying conditions and went through several breakers. They met the general superintendents, the mine superintendents and the foremen of the various collieries, visited and also personally talked with the miners in the lower workings. They will be able to understand questions and ask questions, where they would not have been able to understand if they had not been underground.

SOUTH DAKOTA.

LAWRENCE COUNTY.

A strike is reported by the Golden Treasure M. Co. on upper Deadwood gulch, 2 miles west of Central City. The company has been sinking a shaft on a vertical of siliceous ore; at the depth of 50 feet the vein has widened to 7 feet and ore assays \$45 a ton. E. P. Farnham of Central City is superintendent.

PENNINGTON COUNTY.

The Holy Terror is running a tunnel from the 900-foot level to the old Keystone ledge, which the Holy Terror plans to open up. Prospecting on the 900-foot level with diamond drills is in progress.

UTAH.

BEAVER COUNTY.

In the Cactus mine, Copper gulch, above the 300 level, ore carrying 35% copper has been developed, between the 300 and 400 the rock carries 7%.

A. W. McCune wants thirty teamsters

for his copper mine in Peru. The company pays \$50 per month and board and the men must agree to remain for two years.

N. N. Olsen is manager of the Apollo C. M. & M. Co., recently organized at Frisco.

At Milford the Majestic Co.'s shaft is going down in ore, some of it carrying copper.

SALT LAKE COUNTY.

Ore and bullion settlements in Salt Lake City during October totaled \$2,167,135; for the ten months of the year, \$16,784,681.

The Tribune says the furnaces of the "independent" smelters operating in that vicinity during October produced 1,896,802 pounds of copper bullion, carrying a small percentage of silver and gold. By the management of the Highland Boy there was sent out to the refinery over 600 tons, 346 tons were dispatched to the refineries, the total having a valuation of over \$500,000. There is also reported an increase in the production of copper, gold and silver-bearing bullion at the smelter operated by the American S. & R. Co.

SUMMIT COUNTY.

At the Nalldriver, at Park City, Superintendent Rood has work begun on the new Nalldriver hoist, 30x115 feet, with hoiler rooms, coal hunkers, carpenter shop and blacksmith shop in addition. The gallow-frame is to be of modern pattern, 45 feet hoist, and a three-compartment shaft is to be driven. The machinery for the plant is to be taken from the old Daly. Manager Spiro of the Little Bell of Park City is following up the recent strike and extending the drift to begin sinking on the ore without interfering with the main work.

Superintendent B. H. Hunt of the Deer Trail is piling up galena for shipment.

In Mammoth ground, at the Planetary, the vein is 35 feet between walls; the ores show a valuation from \$4 13 to over \$100 per ton.

UTAH COUNTY.

Superintendent George Summerville of the Pacific G. M. & M. Co. has a tunnel which will tap the vein in 30 feet. Small pockets of carbonate ore have been run through, indicating the ore is near.

WASHINGTON.

Thirty-seven contiguous claims in the Index mining district have been brought under one management. They comprise 21,000 feet on the main ledge. The companies consolidated comprise the Ethel Copper M. Co., the John D Copper M. Co. and the Mother Lode group.

FERRY COUNTY.

Men are employed on the Morning Glory mine taking out ore. Manager E. L. Tate expects the mine to pay its way hereafter.

C. P. Robbins of the Lone Pine Co. says he will not resume operations for the present.

Four cars each of Black Tail and Quilp ore, respectively, are being loaded at Republic for shipment to the smelter.

KING COUNTY.

The report of Assayer Wing of the Seattle assay office for October shows the total amount of gold assayed at the office during the month to be \$2,807,700.48. Mr. Wing estimates that November will be much larger this year than it was last year, for the reason that there are five steamers yet to arrive there from Nome, and he has advised that a large amount of gold dust will arrive from the Klondike district during this month.

WYOMING.

CARBON COUNTY.

Grand Encampment reports that the Osceola Copper M. Co., at the end of a 60-foot crosscut run from the bottom of a 60-foot shaft, has cut a vein, ore identical with the Ferris-Haggarty. The ore where found on the Osceola is 500 feet from the old workings on the Ferris-Haggarty.

Work on the main properties of the Pearl district is going on with satisfactory results. The Coldwater, Zirkel, Grand Republic, Copper King, Big Horn, Hawk-eye, Big Creek, Sierra Madre, Tully, Lizzie, State Line and Kalamazoo are all working full crews. Three of these properties—the Coldwater, Zirkel and Big Creek—have ore that will stand shipping and leave a profit.

The Grant Copper M. Co. will develop their property at Pearl. Considerable prospect work has been done.

LARAMIE COUNTY.

Popp, Dickson, Peterson & Thorenson have bought the Manila group of claims at the head of Whalen canyon and 5 miles from Hartville for \$30,000. The group comprises seven claims, on which veins assaying \$50 a ton in copper and lead have been opened.

FOREIGN.

BRITISH COLUMBIA.

A. J. McMillan of the Snowshoe G. & C. M. Co., before leaving for London, arranged for a hoist of 150 H. P. capacity over the main 300-foot shaft recently sunk on the Snowshoe, which will be the main working shaft of the mine. The hoist will be operated by electric power furnished by the Cascade Water, Power & Light Co., the lines for which extend from Cascade to Phoenix.

At Rossland the Josie mine will discontinue shipments to the Northport smelter for the present.

Kaslo reports eighty tons of Payne mine zinc ore shipped to Iola, Kan., for treatment. Four more cars are to follow. A contract has been made with the Slocan Star mine for 1000 tons per week. Other idle properties carrying zinc values will begin operations.

The Beatrice mine, near Camhounne, owned by Boucher Bros., has been bonded to Anderson & Fullmer of Revelstoke for \$32,000.

Rossland, to Nov. 1, reports tonnage in excess of the aggregate for last year. The record for 1901 has been reached and passed, and the output for the balance of the present year will represent the gain in tonnage over last year.

The Le Roi continues its output at about the figures that have ruled for some weeks, and employs 350 men. The War Eagle and Center Star mines are steadily increasing their output, this week's shipments being 3420 tons. It is expected that a maximum of 3600 tons weekly will be reached by the two mines, and that this will be the standard for the winter. Operations have been resumed at the Homestake mine. Details of the week's shipping operations are: Le Roi 3584 tons, Le Roi No. 2 360 tons, Center Star 2070 tons, War Eagle 1350 tons, Velvet 90 tons; total for week, 7454 tons; for year to date, 280,826 tons.

In southeast Kootenay, on Wild Horse creek, four placer companies have been at work all summer, moving gravel. The production of gold will be larger than that of last year.

The Nickel Plate mine will build a 40-stamp mill at Hedley City.

MEXICO.

CAHUILLA.

The Jimulco M. Co. will build a narrow gauge railroad from its mines to the Central Railroad, 7 miles distant.

CHIHUAHUA.

Chihuahua says the Botello group of mines has been sold to the Guggenheims. It is also reported that another large sale has about been completed whereby this firm will come into control of the Hidalgo M. Co.'s properties near Parral.

COAHUILA.

R. Mehan, manager Viesca smelter of the Coahuila M. & S. Co. of Mexico, says the Hornos Railroad will reach the former place by November 10.

The Reforma mines at San Juan, operated by S. Guggenheim's Sons, have resumed shipments and are now shipping at the rate of 500 tons a month. This output Superintendent Brendell expects to increase to 1500 tons.

SONORA.

The Sinaloa-Sonora Manufacturing & Smelting Co., E. R. Tufts general manager, is installing machinery on its property near Alamos, Sonora. Development work is also being carried on. V. Carrothers has charge of the work at the mines.

Catalogues Received.

The Brown-Corliss Engine Co., Corliss, Wis., a general description of their heavy duty Corliss engines, admirably portrayed and described in illustrated detail, sectional drawings and minute data of construction. The company builds all sizes from 100 H. P. up, and all speeds up to 150 revolutions, both in the vertical and horizontal types.

Standard size, 9x6 inches, "Imperial Air Compressor," Rand Drill Co., 128 Broadway, New York, fully up to the high degree of excellence which characterizes this class of work. The details of description are finely worked out and the illustrations "talk." The two on pages 18 and 19 are about as good as any that has come under the writer's observation.

In black and silver, standard size, 6x9 inches, a 290-page catalogue, No. 7, from the C. O. Bartlett & Snow Co., Cleveland, Ohio, general mill furnishers and suppliers of labor-saving machinery, a well arranged compilation of illustrated description of between 500 and 600 different devices, many of which are special machines made by the C. O. Bartlett & Snow Co. The catalogue is a most interesting one in the line of applied power.

Personal.

J. F. FARGO of Los Angeles, Cal., is in Chicago.

A. M. STRODE is manager Stewart mine, Wallace, Idaho.

J. P. KENNEDY is manager Badger mine, Susanville, Oregon.

D. C. JACKLING has returned to Salt Lake City from Colorado.

CLYDE JACKSON has returned from San Francisco to Tonopah, Nev.

W. S. MANN is assistant superintendent Sheep Creek, Alaska, mines.

L. VON ROSENBERG has returned from Mexico and Lower California.

C. B. ROGERS is general manager Modoc mine, Las Cruces, N. M.

C. A. B. HALVERSON is manager Freeport & Cripple Creek G. M. Co.

JESSE JACKSON is manager and superintendent Oro Fino, Washoe, Nev.

F. L. BOSQUI of Jardine, Mont., will spend the winter in San Francisco.

G. A. HEWSTON has charge of the Duplex Co.'s mill at Searchlight, Nev.

E. L. BALLOU has returned from Pony, Montana, to Igo, Shasta county, Cal.

S. G. WESTON is superintendent Pacific Mining Co.'s property, Elko, Nevada.

J. G. ALLYN of Mariner & Hoskins, is in Oregon, examining gold property.

R. A. HASBROUCK is manager Gold Dust Co.'s properties, Leeshurg, Idaho.

W. T. MENDENHALL will return from New York to Loomis, Wash., next week.

G. R. WOODWARD, Moctezuma, Sonora, Mexico, is manager Sonora Development Co.

H. SIMMINGTON is superintendent the Grand View M. Co., Cherry Creek, Arizona.

M. C. HARRINGTON is superintendent Keystone Co.'s properties, Park City, Utah.

VOLNEY WILLIAMSON has returned to Spokane, Wash., from Zacatecas, Mexico.

A. E. JESSUP of New York City is appointed chief assayer Chinese Mint at Tientsin.

F. A. LEACH, superintendent San Francisco Mint, has returned from Washington, D. C.

H. A. ALLEN succeeds P. R. Roberts as superintendent Adventure mine, Houghton, Mich.

P. C. DUBOIS, manager Conqueror group, Empire, Colo., has returned there from Milwaukee, Wis.

A. G. WILSON has resigned as president and associate manager Mt. Whitney Power Co., Visalia, Cal.

J. M. CROSS of Chicago assumes management of the Cleopatra property, Silver mountain, Empire, Colo.

G. W. OTTERSON has put in at Windham hay, Alaska, a hydraulic plant for the Yellow Jacket M. Co.

A. HOLDEN, managing director U. S. Co., and W. H. Cooldge of Salt Lake City, Utah, are in Boston.

C. H. HENNSMEYER is the Pueblo manager of the recently organized Western Union G. M. Co., Pueblo, Colo.

V. M. CLEMENT, manager Mexican Mining Syndicate, has gone from Salt Lake City to Zacatecas, Mexico.

H. V. WALLACE, general manager Veta Grande M. Co., Altar, Mexico, has returned there from Nogales, Ariz.

E. P. GRINDELL of Tucson, Arizona, visited the Chicago office of the MINING AND SCIENTIFIC PRESS last week.

SUPERINTENDENT TISDALE of the Alaska Snettisham G. M. Co., will operate the Snettisham mines this season.

J. LENOIR of Parral has been engaged as manager Santa Maria mine, at Gavilana, near San Jose del Sitio, Mexico.

J. F. SULLIVAN, manager Golden Valley M. Co., has returned from Denver to the mines at La Dura, Sonora, Mexico.

H. STEVENS, of the California State Mining Bureau, is in Redding, Cal., looking after the interests of the mining lands.

W. N. BISSETT, foreman Consolidated Cariboo hydraulic mine, B. C., has returned to Placer county, Cal., from the interior.

E. DICKINSON, late general manager Union Pacific Railway, is now general manager Kansas City, Mexico & Orient Railway.

W. WILSON, representing the American Con. Copper Co.'s interests in Grant county, New Mexico, has returned from Santa Fe to Lordsburg.

L. G. MARTIN is in San Francisco to superintend the laying of the land lines for the Pacific Cable Co. at San Francisco, and also the land cables at Hono-

lulu. This cable is expected to be in working order between Hawaii and United States by Jan. 1, 1903.

J. B. HASTINGS, former general manager War Eagle and Center Star companies, Rossland, B. C., now of New York, is visiting Spokane, Wash.

D. R. OLIVER, president Zubieta M. Co., has returned to San Francisco, and says he will rebuild the mill of the company, recently destroyed by fire.

F. JOHNSON, who has been in charge of the Stratton Cripple Creek M. & D. Co., Cripple Creek district, Colo., has resigned. His successor has not yet been named.

J. T. KESCEL, former foreman Anchor mill, Park City, Utah, goes to the Sheba G. & S. M. Co., to remodel their mill and take charge, in Star district, Humboldt county, Nev.

J. H. STRITE, who for the past eight months has been building a modern 60-stamp mill at Smuggler, Colo., for the Tomboy M. Co., has returned to his home at Redding, Cal.

L. WALKER has resigned the superintendency of the California mine, Sumpter, Oregon, and taken a similar position with the Cracker-Oregon Co. A. L. McEwen succeeds him at the California.

J. W. YOUNG has resigned the position of secretary to accept that of general foreign manager of the Allis-Chalmers Co., with headquarters in London. Mr. Young will leave for England in about a month.

B. BLAKE has resigned as superintendent Pacific Refinery, Bakersfield, Cal., and goes to Tampico, Mexico, where he will take charge of the erection and operation of a refinery. R. S. Knight succeeds him in charge of the Pacific Refinery.

DR. W. S. WARD, field commissioner of the mining department of the St. Louis Exposition, says: "The mineral display at the St. Louis Exposition will, in my opinion, be the finest ever gathered together in the world." Dr. Ward was assistant director at the Paris Exposition.

Commercial Paragraphs.

T. C. E. HUNTER of the Compressed Air Machinery Co. of San Francisco has returned from Siskiyou county, Cal., where he secured a contract for a 120 H. P. compressor plant for A. C. Brokaw, Quartz valley.

ON his return to Los Angeles, Cal., from examining the property of the Old Dominion C. M. & S. Co. at Globe, Arizona, F. H. Probert brought with him forty tons of their second-class ore, to make a series of concentrating tests at the Llewellyn Iron Works, Los Angeles, to see whether it will be possible to economically treat this class of ore.

J. H. SANBORN, Pacific coast agent for the Leyner drill, reports that at Nevada City, Cal., the Posey M. Co. have bought a Leyner air compressor and water Leyner rock drills. The Oregon-Cracker M. Co. have bought a Leyner duplex air compressor, and at Salt Lake J. J. Trenam, manager Stockton G. M. Co., and F. M. Benedict have bought a Leyner compressor.

THE Colorado Iron Works Co. of Denver, Colo., report recent orders as follows: Keystone Copper Smelting Co., Santa Ana, Mexico, reverberatory furnace, crushers, rolls, Bartlett concentrating tables, impact screens, boilers, engine; Hall & McConnell, Pluma, South Dakota, 100-ton pneumatic cyanide plant; Jezuitlan Copper Co., Jezuitlan, Mex., one 47x120 copper furnace and forehearth.

E. H. STROUD & Co., Chicago, say that a Class 2 Cyclone pulverizer recently sold to a large lead manufacturer has made a surpassing record upon litharge, its capacity upon a 100-mesh product being over 4000 pounds per hour, taking only thirty actual horse power, and that it requires practically no attention, no clogging of the mill, the product free from flakes and so uniform that all passes the 200-mesh sieve.

FROM November 1 the firm of N. C. Bonnevie, consulting engineers, will be known as Bonnevie & Lee, consulting engineers, No. 17 Jacobson building, Denver, Colo. The firm will, as before, make a specialty of designs and superintendence of mining, milling, smelting and power plants, and has in Mr. E. A. Lee, for the last five years chief designer for the American Bridge Co., Denver office, received a valuable addition.

THE Green Horn Mountain Copper M. Co. of Salida, Colo., are installing a concentrating plant in connection with their mine at that place, and last week purchased from the J. H. Montgomery Machinery Co. of Denver, Colo., two sets of 14x27-inch high-grade crushing rolls and other necessary machinery to equip their plant. They expect to be running before winter sets in. The Montgomery Machin-

MINING AND SCIENTIFIC PRESS

Whole No. 2208.— VOLUME LXXXV.
Number 20.

SAN FRANCISCO, CAL., SATURDAY, NOVEMBER 15, 1902.

THREE DOLLARS PER ANNUM.
Single Copies, Ten Cents.



Bullion Vat Furnace; Bullion Loading for Shipment From Smelter, El Paso, Texas.



Boiler Room of El Paso Smelter; Oil Fed Boilers; Circulating Oil Pump on the Right: Pump Room Seen Through the Door.

New Smelting Plant at El Paso, Texas. (See Page 280.)

MINING AND SCIENTIFIC PRESS.

ESTABLISHED 1860.

Published Every Saturday at 330 Market St., San Francisco, Cal.

TELEPHONE, DAVIS 771.

ANNUAL SUBSCRIPTION:

United States, Mexico and Canada.....\$ 3.00
All Other Countries in the Postal Union.....5 00

Entered at the San Francisco Postoffice as second-class mail matter.

Chicago Office (Telephone, Harrison 73)737 Monadnock Block.
Denver Office (Telephone, Olive 733).....606 Mack Block.

J. F. HALLORAN.....Publisher.

San Francisco, November 15, 1902.

TABLE OF CONTENTS.

ILLUSTRATIONS.—Bullion Swat Furnace—Bullion Loading for Shipment; Boiler Room of El Paso, Texas, Smelter, 276. General View of the El Paso, Texas, Smelter; Appearance of Furnaces of El Paso Smelter After the Fire of July, 1901; Electric Power Car at Smelter, El Paso, Texas, 230. De Lamar, Nevada; View of Old De Lamar Mill, De Lamar, Nev.; Section of Engine Room De Lamar Mill, De Lamar, Nev., 232. The New Works of the Lunkenheimer Co.; Cylinder in Horizontal Position for Inserting or Removing Tracings or Paper, 233. Mining and Metallurgical Patents, 234.

EDITORIAL.—Isolation of Mining Camps; The Low Price of Silver; Something Unique in Mining Litigation; Advance in Mining and Metallurgy; Interesting Mining Topics, 277.

MINING SUMMARY.—285-286-287-288.

LATEST MARKET REPORTS.—17.

MISCELLANEOUS.—Concentrates, 278. Gold and Silver Statistics; Barium Dioxide in Cyaniding; Electric Development White River, Wash.; Profits of Gold Dredging in New Zealand, 279. New Smelting Plant at El Paso, Texas, 280. Ores Which Are Deposited by Underground Waters; A New Colliery Explosive, 281. De Lamar, Nevada, Mines; Treatment of Sulphides, 282. Lunkenheimer New Works; Pyritic Smelting of Gold; Blue Printing by Electricity; Notes on the Estimation of Copper by Potassium Permanganate, 283. Mining and Metallurgical Patents, 284. Personal; Commercial Paragraphs; Catalogues Received; Book Notices; Obituary; New Patents; Notices of Recent Patents, 288.

THE isolation of some mining camps is illustrated by the fact that the miners at Dale, San Bernardino county, Cal., were unable to take part in the general election on the 4th inst., because no ballots or election supplies had been received. In loading the stage at the railway station for its 80-mile trip the precious package was omitted, and about twenty California miners missed their chance to vote.

THE extraordinarily low price of silver—for the first time below 50 cents an ounce—affects mining, as it tends to check the production of gold, copper, lead, and even zinc. The economies of silver production have not, however, reached the limit, and it is possible that cheaper methods of silver production and reduction may meet the present low price. The world-wide conditions do not at present lend encouragement to belief in immediate higher prices.

SOMETHING UNIQUE in mining litigation is reported from Utah, where in a mine case decision both the plaintiff and defendant appeal to the Supreme Court. Ordinarily it is only the party adversely affected that seeks reversal from the higher court. Suit was brought by the Santaquin M. Co. against the High Roller M. Co. to determine ownership of a disputed area between their respective claims. The judge found that the Silver King lode was the prior location and decided that the area in conflict belonged to the Silver King lode and not to the High Roller people. But it transpired that the Silver King had been located by men who had transferred it to the Santaquin Co. before its incorporation. Accordingly the judge decided that that company had no legal title thereto, and, hence, had no right to bring suit. Then he dismissed the case and assessed the costs equally between the litigants. And now both litigants appeal therefrom.

EVERY advance in mining and metallurgy is the concentrated product of intelligent thinkers and workers who have thought out and wrought out that which is used by all with general profit. Such ability to use the fruits of others' labor constitutes a debt that can best be repaid by contributing to the common stock of knowledge. No department of industry offers more notable improvements than do mining machinery and appliances. In the last ten years the discovery of the cyanide gold solvent has in that one branch created a new line of special machinery. The same is observable in concentration, in machine drills, in the application of electricity, in pumping. Indeed, within the last twenty years the only recognizable thing about a gold mine in common with the old regime is the stamp mill, and that is fast being changed and modified till it bears only a resemblance to its prototype. It will be, however, many years yet till the stamp mill goes into a museum.

Interesting Mining Topics.

Next Monday, the 17th, at Golden Gate Hall, San Francisco, will meet the eleventh annual convention of the California State Miners' Association. Among other things at that meeting will be for the first time an effort to have read some practical articles on every day mining matters by practical miners, with accompanying discussion, a sort of exchange of information, the discussion being in some cases at least as interesting as the article that elicits such oral comment. This is considerable of a departure from the original idea of the Association's meetings, and is largely experimental. The idea is to get more direct and immediate benefit from these annual meetings in the way of practical interchange of knowledge and experience. There is an infinite variety of subjects on which miners and metallurgists could furnish interesting articles, which, with the accompanying discussion, would be of value. Here is a partial list—100 subjects, any or all of which would be interesting to miners at future meetings:

How to best save the fine gold when milling cemented gravel in drift mines; an example of successful co-operative mining; profitable working of a custom stamp mill; the building and operation of a wing dam; best arrangement for drop of stamps and why; experience with hydraulic elevators; improvement in arrangement of pipe lines and delivery of water through monitors; daily work of a cyanide plant; leaching carbonate copper ore with sulphuric acid; results of this season's river mining; cost of mining and milling gold ore; practical method of mine examination; economical work in running a tunnel in hard ground; treatment of low-grade copper ore; relative value of electric and compressed air power, by one who has tried both; how a fire in a shaft was successfully handled; sampling lead ores; retorting amalgam; main requisites in a mining report; improvements in gold milling; use of liquid chlorine in chlorination process; proper contour of silver-lead furnaces; example of profitable treatment of mine tailings; how a leaser made his lease profitable; new points in mine timbering; successfully resisting a claim jumper; best location and arrangement for a gold mill; experiences of a prospector; overcoming of machinery transportation difficulties; system of fire protection in a mining camp; building a pipe line; satisfactory instance of profit sharing; wear and tear of shoes and dies; best disposition of smelter slag; record of unwatering a mine; building and maintaining reservoir dams; successful record of a debris storage dam; timbering in drift mines; utilization of waste water; admission of visitors into a mine; relative value of zinc dust and zinc shavings in cyanide process; amalgamation tests; relief in case of mine accident resulting in personal injury; best arrangement of 10 stamp mill; successful securing of gold from black sands; to obviate loss in scorification assays; use of chuck-block in mortar; working with an arrastra; assaying concentrated sulphurets; slow vs. rapid-drop stamps; prospector's drill; cam improvements; belting on concentrators; incline vs. vertical shafts; river dredging; mining low-grade cinnabar ore; ditch and flume building; wooden vs. iron battery frames; lead dust accumulator; flash light photography; practical working of miners' unions; battery sizing boxes; sharpening drills; effective form of rolls; making valuable an abandoned mine; what a dry washer can do; proper duties of a mine foreman; removal of amalgam from copper plates; economic matting of sulphide ores; ore sampling in mill; organizing a joint stock mining company; one day in a mine manager's active duties; development of a prospect into a paying mine; successful drainage of a deep shaft; ventilating a drift mine; best weight for stamps; suitable arrangement of mill building on site; putting off large quantity of blasting powder; vertical vs. horizontal engine for stationary work; how assessment work is done; experience with iron rifles as a gold saver; timbering an incline shaft; changes in stamp practice; developing a prospect; selling a mine; operation of an amalgamator; details of cost of 6x8 tunnel; some ultimately successful mistakes; transmission of power; oil as fuel; ore sorting; mine inspection; application of belts and pulleys; utilization of water power; cleaning up after a cave; good method of bank blasting; improvements in sluice building; ore amalgama-

tion in the mortar; best way of ore crushing for cyanide process; errors in mill construction.

This list has been published herein before, as suggestive titles for articles requested from wide-awake men who do the things they talk about, for publication, as a sort of recompense for what they have learned from reading other communications from fellow miners. Of course, it is not even intimated that one-tenth of these suggested topics could be treated in one meeting. At many meetings of mining, electrical or civil engineers the appearance on the platform of a member "with a paper to read" is a signal for two-thirds of those present to go out, and with the necessary detail of a convention which lasts but three days, it is not likely that more than four or five papers will be read or discussed. Usually the most interest centers in the resolutions and the election of officers, and the work of the convention is left to the committees. Still, there are possibly members of the Association who would like to get more direct practical benefit from their presence.

The subjects of the papers to be read at next week's convention are as follows:

"Flume Construction," by W. C. Ralston; "Concentration of Gold Ores," by M. B. Kerr; "Methods of Mine Timbering," by J. O'Brien; "The Protection of Forests," by A. D. Foote; "Recent Improvements in Smelting," by Herbert Lang; "The Application of Crude Oil in Smelting," by A. von der Ropp; "Electric Power in Mining," by J. B. Tregloan; "Application of Machine Drills," by H. P. Stowe; "Observations on the Development of Gold Mines," by H. Z. Osborne; "Gold Dredging Industry," by T. J. Barbour; "The Design of Water Wheels for Use in Mining," by G. J. Henry; "The Cyaniding of Concentrates," by S. B. Christy; "Petroleum Oil Fields of California," by C. T. Deane; "Petroleum Oil as a Fuel," by A. M. Hunt; "General Mining Statistics," by C. G. Yale.

People of any kind of business or work always like to hear or see how others in their line view the same problems that are common to all workers in that branch of industry. It is naturally interesting to a man who has tackled successfully or unsuccessfully some bothersome thing in his daily duty as a mine superintendent, or mill man, or smelter, or foreman, or practical worker, to know how just the same difficulty was handled by some fellow worker from some other county or State, and, in bearing how it was done, a third or fourth, who thought it all out or worked it out years ago, may get a pointer from the newer way of doing it or looking at it, or discussing it may throw additional light on the solution of a vexatious question.

It is the modern tendency to have such organizations, such discussions, such mutual aids to mutual advancement. An important part of the technical literature that comes to this office is the published reports of the various technical societies all over the country. There is always a meeting of one of them—the country is so big, and the workers and their societies are getting so numerous that there is a continuous succession of them. And the published reports of the articles read and the discussions that followed make up the most interesting data. Such data is of value because it is the newest, freshest, best production of the men who are doing these things, and whatever it is about, whether mining, metallurgy, chemistry, electricity or anything else, it is the present state of the art, fuller and fresher than anything in text-books.

Of course, it may be said: "Very fine, no doubt, but that is not what the California Miners' Association was started for." Doubtless, it was not, but it need not interfere with what the Association was started for, but might aid and supplement the original aim and intent of that organization.

With no desire to make innovation, but with the friendly zeal that is felt by one who has attended every meeting of the Association, the writer expresses the belief that in doing what every other similar organization in the country is doing, the Association might, without derogation of its other duties, do itself and the miners it represents a service in the way indicated.

When one looks back, the past always looks narrow; the horizon always widens when one looks ahead, and the future grows broader.

Concentrates.

THE melting point of manganese is 1245° C.

STEAM in a boiler at eighty pounds pressure has a temperature of 323° F.

IN the Almaden, Spain, quicksilver mines, operations are carried on at a depth of 338 meters.

WITH a shaft 618 feet deep, full of water, the pressure per square foot at the bottom of the shaft would be 38,625 pounds.

WITH 55,000 cubic feet of air passing through a circular shaft 10 feet in diameter, the velocity per second would be 11.67 feet.

THE article which appears in the publication mentioned, and marked "Copyrighted," was written for and originally appeared in this journal.

THROUGH an opening 6 feet high and 10 feet wide, air with a velocity of 450 feet per minute would pass at the volume of 27,000 cubic feet per minute.

IN the case of normally acid pulp in the cyanide vats about 4 pounds of lime per ton of sands would correct it, an ordinary solution being subsequently run on.

IT has been approximately calculated that about 5,000,000 persons find direct employment in the world's mines. These in turn give employment to about 25,000,000 others.

WITH 80 pounds boiler pressure, cutting off at quarter stroke, the mean effective pressure (not the average pressure) in a non-condensing engine running under normal conditions will be 40 pounds.

THE little iron bolt that appears to be copper, but has only a slight film of copper on its surface, is covered by dipping in a solution of sulphate of copper $3\frac{1}{2}$ ounces, sulphuric acid $3\frac{1}{2}$ ounces, water one to two gallons.

THE U. S. Geological Survey has charge of the geological investigations, reports, maps, etc., and is a part of the Interior Department. The U. S. Coast and Geodetic Survey maps the coast waters, and is a bureau of the Treasury Department.

IT is a misdemeanor under the Penal Code of Arizona for any director of any stock corporation therein to declare a dividend except from the surplus profits arising from the business of the corporation, and in cases and manner allowed by law.

DISUSE or non-use of a water right is not an actual abandonment, but long continuance of such non-use would indicate intention to abandon. Abandonment is a question of intention, and whatever clearly shows that intent is admissible evidence.

THE British gallon of water contains 277.274 cubic inches; the United States gallon of water, 231. There are 7.48 United States gallons in a cubic foot, 6.23 British. A British gallon of water weighs 10.01 pounds, a United States gallon 8.35 pounds.

STANDARDIZATION is a good thing, but not to be worshipped. The fact that a thing is standardized does not mean that the standard, whether it be a screw or a gauge or a boiler or a drill, is the best thing of its kind. A standard is merely a fixed thing.

AS THE tellurium so thoroughly impregnates and colors the gold that the ordinary application of acids will not disclose the gold color to view, it can only be separated from the base metal by smelting, a process seldom available by the prospector.

THE efficiency of methods of the transmission of power may be stated to be very close to the following, when full load is transmitted: Wire rope, 68%; water, high pressure, 53%; water, low pressure, 50%; compressed air, 50%; compressed air reheated, 65%; electricity, 73%.

THERE would be little objection to profit sharing on the part of the employees in the plan proposed from South Dakota, but the most potent objection to the scheme would be the difficulty of inducing them to share in the losses that inevitably occur in all businesses.

IN gold dredging on the Feather river in Butte county, Cal., the yield is from 10 cents to 75 cents per cubic yard of material handled. The cost averages about 5 cents per cubic yard, which includes all expenses. The whole thing has been described and illustrated herein in every detail.

THE United States mints pay \$18.60 per ounce for gold, standard, 9 fine. Where the bullion deposited for coinage is suitable there is no charge. The depositor gets \$1 for every 23.22 fine grains Troy gold in his deposit. The charge for simple recoinage of gold is \$1 for 1000 ounces.

IN handling timbers in a large mine winzes may be cut in or near the foot wall of a vein, reaching from level to level, timbers to be used in the stope lowered or run down through the winze and delivered on the floor where they are to be used, saving much time in underground hoisting.

TO KEEP machinery from rusting dissolve one ounce camphor in one pound melted lard; remove the scum; mix as much black lead with the lard and camphor as will give it an iron color; clean the machinery well; smear with the mixture; after twenty-four hours rub off; clean and polish with soft cloth.

AN air compressor at 3000 feet altitude, to furnish air for twenty-five $2\frac{1}{2}$ -inch rock drills in rock of ordinary hardness, the drills being 2000 feet from the compressor,

would require 272 H. P.; a duplex air compressor with 18-inch steam cylinders; 20-inch air cylinders; 24-inch stroke, making 175 strokes per minute.

THE Emplre mine, Grass Valley, Cal., has been a continuous gold yielder for fifty-two years. It is a good illustration of the permanence of gold mining as a business. In banking, merchandising, manufacturing, or any other department of industry, what business founded in California in 1850 is in active successful operation today!

FROST-PROOF MORTAR may be made by taking one barrel Portland cement, one barrel slaked lime, three barrels sharp sand; mix the whole dry, then add sufficient quantity of the carbonate of soda solution to make of proper consistency. The first setting should take place in one hour. After twelve hours good cement should have reached the final setting stage.

SO FAR as known, there is no record of mortality among American miners. In South Africa a record of deaths among 1377 rock drill men employed on the Rand showed an annual average of mortality of about 7%. The regular average mortality among healthy men aged 35 years in Europe is 0.8775%, which would make the mortality noted about eight times the normal death rate.

ZINC should not be used in contact with copper, iron or lead, as voltaic action is set up, especially when moisture is present, thus destroying the zinc. Salt, lime, water containing lime, and acid woods are also very destructive of it. When first exposed to the action of the atmosphere it is speedily corroded, but the film of carbonate of zinc thus formed protects it from further oxidation.

IT has already been proposed to utilize the waste heat from smelter slag to generate electric light and power. George Mitchell of Cananea, Sonora, Mexico, is credited with having offered at Butte, Mont., to furnish the copper plant with free power, and with the surplus to light the city and operate the street railway system; but thus far the feasibility of the idea has not been practically demonstrated.

TO CALCULATE the volume or amount of water flowing from a tank, multiply the square root of the depth of the water in feet by 5, and then by the area of the opening in square feet; the result will be the number of cubic feet per second. From a tank 8 feet deep, through an opening $1\frac{1}{2}$ inch diameter, the head being constant, would thus flow $2.8231 \times .01227 \times 5 = .173197185$ cubic feet per second, or 10.3913311 cubic feet per minute.

NO PART of the value of permanent and immovable improvements on a mining claim, made long prior to the location thereof by claimants under a previous location embracing the same ground, solely to improve and develop the prior claim, can be credited to the latter toward meeting the requirement of the statute "that \$500 worth of labor has been expended or improvement made upon the claim by himself (the claimant) or grantors."

IN the United States in 1900 there were 117 plants engaged in the smelting and refining of metals, 39 in the smelting and refining of lead, 47 in copper and 31 in zinc. The total capital invested in the smelters and refineries was \$139,354,138, employing 1121 officials and clerks, drawing salaries amounting to \$2,150,018, distributing \$15,937,626 to 24,504 wage earners, expending \$279,655,350 for raw materials and turning out manufactured products valued at \$358,786,472.

IN roasting sulphides there is an alteration of obnoxious compounds into indifferent ones; there is also the removal of sulphur, by which the ore grain becomes porous, the fine particles of gold and silver thus becoming accessible to solvents; there is, in addition, a fritting of the fine ore grains admitting of subsequent rapid leaching. If not roasted dead, however, instead of insoluble oxides are a mixture of sulphates and oxides, as well as undecomposed sulphides, and consequently, a less porous product.

PLATINUM was first discovered in Russia in 1819, although the actual exploitation commenced in 1824. From 1828 to 1845 platinum money was coined in Russia, these coins being 3, 6 and 12 roubles. The total amount put in circulation was 4,250,000 roubles, about \$3,272,500. During that period the production of platinum increased materially, but when the coinage was stopped the exploitation of the mineral almost entirely ceased and only revived in 1859. From that time the production increased with the foreign demand and market price.

THE Northern Pacific has about 20,000,000 acres of land left, the Canadian Pacific 22,000,000 and the Great Northern less than 1,000,000. The latter road will have disposed of all its lands within a very short time. The remaining scattered acres are in closely adjacent States. It is said that last year the average price received per acre was \$9. The Northern Pacific sold its lands last year in immense tracts to syndicates. Much of the land was timber land. The average price was \$1.50 per acre. The Canadian Pacific's sales of purely agricultural lands lying adjacent to the rails averaged \$3.25 per acre.

IN cold climates the employment of concrete has its objections, in that the material will freeze before it sets, and upon thawing is found to be practically worthless. In such cases the operation of setting may be hastened by dissolving two pounds of carbonate (not bicarbonate or cooking) soda in one gallon of water, boil the solution and use it in mixing the concrete with whatever addi-

tional water is required; the water and sand should also be heated. This heat will remain long enough to allow the concrete to set, which should be about forty-five minutes. Subsequent freezing, if the mass is not thereby cracked, will not injure the concrete.

IF copper sulphide be fused in presence of a suitable flux, for which a blast furnace slag, melting at about 1500° C., is found available, and calcium carbide added in theoretical proportions, the reduction occurs readily, the calcium sulphide dissolving in the slag, and the copper being recovered as an ingot free from sulphur. If copper pyrites be subjected to the same treatment, it is found that the ingot obtained is composed by two sharply separated layers, of which the lower is copper and the upper iron, saturated with carbon. For ores containing zinc or other metal volatile at the temperature used, a closed retort may be employed and the vapors condensed in the usual manner. The reduction of copper pyrites by this method requires an amount of 80% carbide, somewhat exceeding the weight of the ore; for copper sulphide the carbide and ore are used in the ratio 1 : 2.

IF the boiler pressure be taken at 200 pounds absolute, at which pressure 1 pound of steam occupies 2.27 cubic feet of space, the evaporation per second, or the volume of steam generated in the tube, will be .0163 cubic foot per second, occupying say 23 inches length of tube. Thus nearly half the length of the tube is filled with steam in each second of time, and the rate of flow equal to this head of water (H) is expressed in feet per second as $v = 8\sqrt{H}$, where H is in this case nearly 2 feet. v thus becomes 11 feet per second. But as the feed water has been found sufficient to fill only $\frac{1}{4}$ inch of tube, this flow is 782 times the feed, and, of course, could not continue, because the head due to space occupied by the steam would be reduced by the same proportion. Let the difference of head be reduced to 12 inches. Then $v = 8\sqrt{1} = 8$ feet per second velocity of flow due to a head of 12 inches.

IN the case of DeLamar vs. DeLamar Min. Co., Ltd., 117 Fed. Rep., (U. S.), 240, the court decided that the Waldstein patent, No. 607,719, for a process for extracting precious metals from cyanide solutions by the use of zinc dust as a precipitating agent, and the agitation of the solution until the precipitation is complete, "is void for lack of invention and anticipation, every step in the process having been disclosed in prior patents and publications. The additional features of claims 2 and 3, in requiring the use of a 'definite quantity' or the 'exact quantity' of zinc dust sufficient to precipitate the contained metals, does not render the process patentable, since the proper proportion is not given, nor the means for ascertaining it; and, conceding that such fact does not render the claims fatally defective, the patentee not being the inventor of the use of zinc dust by means of agitation as a precipitating reagent, the public is free to use such quantity as may be required to best produce the desired result."

A FLUID compound of carbonic acid, ammonia and water, with a few other saline ingredients, contains all the elements of protoplasm, and plants can subsist upon such a substance and form it into protoplasm within their cells, but from such a fluid animals can derive no sustenance. The animal can raise only the complex substance of dead protoplasm, as we find it in our food, to the higher power of living protoplasm, while the plant can raise the less complex substances—carbonic acid, water and ammonia—to the same stage of living protoplasm. It should be noticed that the existence of the "matter of life" depends on the pre-existence of the three compounds, carbonic acid, ammonia and water. Withdraw any one of these three from the world and all vital phenomena come to an end. They are related to the protoplasm of the animal. Carbon, hydrogen, nitrogen and oxygen are lifeless bodies. Of these carbon and oxygen unite and give rise to carbonic acid, hydrogen and oxygen give rise to ammonia, and these compounds are all lifeless, like the elements of which they are composed, but when under certain conditions they are brought together they give rise to the still more complex body which we call protoplasm, and which exhibits the phenomena of life.

ALL alloyed steels can be annealed by packing in airtight boxes or muffles and then placing them in the furnace and maintaining an even temperature of say about 1200° F. for twenty-four hours, then permitting it to cool down slowly. One exception to this rule would be high manganese steel. Charcoal or any of the carbonaceous substances will answer for the packing material. Sometimes each individual piece of steel is wrapped up in asbestos and is packed in the box with layers of charcoal between them. After being annealed they show a much finer and velvety texture. The very hardest steel, if not hard enough to cut the material, can be heated to a good orange color and quenched in the blast, and in the absence of this oil can be used for the quenching. On those steels which are medium hard, the blast, the oil, or hot tin or lead can be employed. The tin or lead is just brought to the melting point, and the tools are partly chilled in this and then taken out and placed in the oil or blast. The mildest steel cannot be quenched in the blast, and must be tempered in the oil and water. When tempered in the water they are heated carefully, the cutting points are dipped in the water, drawn to the straw color, and then placed in the oil, so as to prevent the temper from running. A good annealing will place the steel in such a condition that it can be tempered in water, which gives it great endurance.

Gold and Silver Statistics.

G. E. Roberts, director of the U. S. Mint, has completed his report upon the production of the precious metals for the calendar year 1901. The final figures for the world's output by countries are as follows:

Country—	Gold.	Silver, Commercial Value.
United States.....	\$78,666,700	\$33,128,400
Mexico.....	10,284,800	34,593,900
Canada.....	24,128,500	3,145,600
Africa.....	9,089,500	7,829,500
Australasia.....	76,880,200	94,200
Russia.....	22,850,900	1,198,000
Austria-Hungary.....	2,136,700	3,113,000
Germany.....	59,800	99,500
Norway.....	41,700	32,400
Sweden.....	35,300	450,800
Italy.....	8,600	1,911,200
Spain.....	1,300	2,300
Portugal.....	692,300	257,700
Greece.....	24,500	4,700
Turkey.....	1,300	271,300
Finland.....	276,300	133,000
France.....	30,000	27,000
Great Britain.....	119,600	6,152,600
Argentina.....	1,067,200	5,553,100
Bolivia.....	2,081,600	1,129,000
Chile.....	110,000	4,600
Colombia.....	2,775,400	.....
Ecuador.....	321,200	.....
Brazil.....	1,771,600	.....
Venezuela.....	405,400	.....
Guiana (British).....	2,000,000	.....
Guiana (Dutch).....	1,329,200	3,360,500
Guiana (French).....	31,700	500
Peru.....	640,300	527,800
Uruguay.....	1,201,600	1,037,800
Central America.....	9,901,500	.....
Japan.....	4,500,000	.....
China.....	9,395,900	.....
Corea.....	861,700	.....
India (British).....	435,000	48,500
East Indies (British).....	.....	.....
East Indies (Dutch).....	.....	.....
Totals.....	\$263,465,000	\$105,598,200

The total number of fine ounces of gold produced was 12,740,746, and of silver 174,998,573, the coining value of the latter being \$226,260,700.

The imports and exports of the precious metals of the principal countries during the calendar year 1901 are exhibited in the following table, the information relating to foreign countries having been received principally through representatives of the United States in those countries:

Country—	Gold Imports.	Exports.
United States.....	\$54,761,880	\$57,783,393
Africa.....	1,595,959	9,713,588
Austria-Hungary.....	35,731,855	7,585,753
Canada.....	4,579,809	24,744,890
Costa Rica.....	385,077	550,510
Denmark.....	804,000	.....
Egypt.....	14,677,469	11,971,274
France.....	82,778,158	27,985,000
Fed. Malay States.....	1,870,878	875,952
Germany.....	61,126,228	12,278,509
Great Britain.....	104,060,588	67,961,962
India.....	26,957,409	20,666,059
Italy.....	914,994	2,067,640
Japan.....	5,308,563	5,770,562
Corea.....	1,290	2,450,737
Mexico.....	.....	9,593,594
Netherlands.....	4,207,059	691,606
Nicaragua.....	.....	455,000
Norway.....	516,386	.....
Siam.....	2,361,450	79,700
Sweden.....	731,461	.....
Switzerland.....	13,407,332	4,009,891
Russia.....	4,459,685	34,870,237
Portugal.....	1,322,387	1,353,909

The net exports of Australasian gold are estimated at \$76,880,200 and of Chinese gold \$9,091,500.

Country—	Silver Imports.	Exports.
United States.....	\$31,146,782	\$55,668,358
Africa.....	1,744,947	55,984
Argentina.....	23,995	86,599
Austria-Hungary.....	993,975	1,263,382
Bolivia.....	.....	13,691,268
Canada.....	242,215	2,136,359
Costa Rica.....	.....	47,043
Denmark.....	.....	.....
Dutch Guiana.....	52,560	28,097
Ecuador.....	.....	.....
Egypt.....	576,037	50,972
France.....	18,885,433	27,119,335
Fed. Malay States.....	11,063,574	9,432,220
Germany.....	4,479,537	6,981,031
Great Britain.....	61,141,061	58,640,532
India.....	39,885,187	16,549,234
Italy.....	1,430,707	1,398,994
Japan.....	154,255	1,281,509
Corea.....	450,557	100,473
Mexico.....	2,279,875	50,609,606
Netherlands.....	3,278,008	889,557
Nicaragua.....	50,000	50,520
Norway.....	187,264	.....
Peru.....	6,738	98,712
Siam.....	762,207	186,916
Sweden.....	83,062	.....
Switzerland.....	8,429,956	2,278,442
Russia.....	4,818,548	1,905,930
China.....	4,334,047	148,310
Hongkong.....	7,623,616	3,747
Straits Settlement.....	13,787,004	167,633
East Africa.....	606,510	32,227
Arabia.....	617,226	266,805

Ceylon.....	2,011,280	1,154,470
Persia.....	392,217	236,105
Turkey.....	886,462	.....
Australasia (net).....	.....	6,089,858

Mr. Roberts says that the annual consumption of the precious metals is estimated in round numbers at \$80,000,000 gold and \$57,000,000 silver.

The silver market was depressed throughout the year. The highest quotation on the London market was 29½d on January 2, and the lowest 24½d in December. The purchases on account of the Government of India fell off heavily from the preceding year. The coinage of the Indian mints for the eleven months ending with February, 1902, was only 48,507,600 rupees, against 150,780,774 rupees in the same months of the previous year. The demand for China also declined owing to the retirement of most of the foreign troops called there during the Boxer troubles of 1900. While the troops were there the shipments of silver were exceptionally large, and after their retirement silver bars and Mexican dollars accumulated at the seaports in unusual amounts, rendering further imports for the time unnecessary. The European demand for silver for coinage purposes is light, as the Governments are pursuing the policy of supplying needs for subsidiary coins by the recoinage of full legal tender coins.

About 30% of the silver output of the United States is from silver ores, the remainder being produced in conjunction with lead and copper. After allowing for industrial consumption, the increase in the gold stocks of the principal countries for the calendar year 1901 are estimated to have been approximately as follows:

United States.....	\$63,800,000
Austria-Hungary.....	27,600,000
Belgium.....	1,900,000
Great Britain.....	17,000,000
India.....	5,880,000
France.....	40,400,000
Germany.....	41,700,000
Italy.....	3,500,000
Japan.....	1,700,000
Netherlands.....	5,600,000
Portugal.....	2,300,000
Roumania.....	1,800,000
Sweden.....	1,800,000
Switzerland.....	3,500,000

The only countries showing a loss during the year are Norway, \$1,600,000, and Russia, \$9,700,000.

Electric Development White River, Wash.

Written for the MINING AND SCIENTIFIC PRESS.

The general plan of the White river power development by the Snoqualmie Falls & White River Power Co. will be to divert the water of White river, Washington, and to convey the waters thus diverted through an excavated canal to Lake Tapps. The level of this lake will be raised until it occupies an area of about 5000 acres, and will serve as a storage reservoir and settling basin. The outlet of this lake will be a short canal and tunnel connecting with a penstock on the brow of the hill overlooking the Stuck valley. Steel pipes leading from the penstock will convey the water under a head of 450 feet to the waterwheels in the powerhouse at the foot of the hill; and from the waterwheels the water will escape through a short tailrace into Stuck river. The powerhouse will be connected in with the present Snoqualmie Falls transmission system by circuits about 5 miles in length.

The intake at the point of diversion will be constructed of concrete masonry. The level of the river will be raised at this point, in order to effect a full entrance of the water into the intake by the construction of a submerged dam across the river, which will be continued to the intake in the shape of an earthen embankment designed to be higher than the river at any stage. There will also be constructed at the intake and in connection therewith a set of gates for the purpose of discharging the water back into the river and in shutting the same off from the canal at any time it may be desired to do so for inspection or repair purposes.

The canal throughout its entire length will be a

thorough cut through earth and cement gravel. The canal will be 25 feet wide on the bottom, with side slopes of 1½ to 1 below the water line and 1 to 1 above the water line, and will flow 6 feet deep. The canal and intake are designed to discharge a volume of water equivalent to 60,000 theoretical horse power under 450 feet head.

The contour of Lake Tapps is such that the raising of its level would overflow the lake at eight different points; but this is to be prevented by the construction of earthen dams at these particular points. Aside from these dams, the only work to be done in connection with the reservoir is to clear about 1000 acres of land across the lake and to build a ditch to connect Church lake with this storage reservoir.

The penstock is designed to receive the full discharge of the canal and will be constructed of concrete masonry. The penstock will have five outlets, through which will be discharged the water to the different pipe lines.

The present development contemplates the installation of one pipe line at present, sufficient in size to deliver 10,000 H. P. More pipe lines will be added later, as additional waterwheels are installed. The pipe lines will be of rolled steel plates riveted together and supported by concrete piers and anchored firmly to the earth.

The power house is designed to accommodate a 50,000 H. P. installation of waterwheels, generators and accessories. As an adjunct, there will be a machine shop, equipped with lathe, drill press, shaper and blacksmith forge, with necessary accessories. There will be installed in the power house two 3000 kilowatt generators and two exciters of the Westinghouse type, directly connected to impact waterwheels of sufficient capacity to drive the generators under full load.

There also will be erected, either separately or in connection with the power house, a transformer house and there will be installed therein 10,000 H. P. of raising transformers.

Profits of Gold Dredging in New Zealand.

C. E. Turner, describing gold dredging on the Matakita river, New Zealand, gives figures of costs and profits of interest. Mr. Turner says that the industry is profitable, if properly conducted, which is evident from the following figures. The nominal capital of a company need not exceed £12,000. This acquires the claim, buys new dredge complete and stores sufficient for six months:

COSTS OF WORKING.

Labor.	Per Week.
Dredge master.....	£ 6 0 0
Engineer.....	4 0 0
Two drivers at £3.....	6 0 0
Three winchmen at £3.....	9 0 0
One general hand.....	2 10 0

Total.....£27 10 0

Stores, etc.	Per Week.
Firewood or coal.....	£12 0 0
Lighting and lubricants, etc.....	1 0 0
Wear and tear.....	16 0 0

Total.....£29 0 0
Plus labor.....27 10 0

Total.....£56 10 0

Gold at £4 the oz. = 14 ozs. 2 dwts. 12 grs., say 14 ozs. to cover expenses.

Usually the engineer takes either the morning or 4 P. M. shift, so that the machine runs the whole twenty-four hours.

It will readily be seen that a dredge capable of handling 1200 cubic yards per twenty-four hours (which is a small amount) of wash that will average only 2 grains per yard will pay a good dividend. Thus 1200 yards at 2 grains = 2400 grains = 100 pennyweights = 5 ounces per day of twenty-four hours = in one week 30 ounces at £4 = £120, less working costs £56 10s, gives £63 10s profit, which = £3302 per annum. Deducting £302 for secretary and office expenses, there remains the handsome profit of £3000, or 25% on the nominal capital of the company.

Barium Di-oxide in Cyaniding.

Following is a summary of cyanide treatment at the City and Suburban mine, Johannesburg, S. A.,

designed to show the comparative results obtained with and without the use of barium di-oxide, as supplied by E. Schilz:

	Concentrates.	Coarse Sands.	Fine Sands.
Tons treated with BaO ₂	1,750	3,254	24,783
Tons treated without BaO ₂	563	1,898	23,863
Average value of sands per ton treated with BaO ₂ (dwts).....	18.332	17.267	6.486
Average value of sands per ton treated without BaO ₂ (dwts).....	19.767	14.975	5.136
Average value of residues per ton treated with BaO ₂ (dwts).....	1.640	1.719	0.867
Average value of residues per ton treated without BaO ₂ (dwts).....	1.981	2.290	1.360
Percentage of extraction with BaO ₂	91.06	90.05	86.64
Percentage of extraction without BaO ₂	89.98	84.70	73.53
Improved extraction in dwts. per ton with BaO ₂	0.341	0.571	0.493
Improved extraction in money value per ton with BaO ₂	17.39d.	29.12d.	25.14d.
Cost of BaO ₂ used per ton.....	10.87d.	11.16d.	3.10d.
Net gain per ton treated with BaO ₂	6.5d.	17.96d.	22.04d.

New Smelting Plant at El Paso, Texas.

Written for the MINING AND SCIENTIFIC PRESS by C. W. ARTHUR.

Three miles from El Paso, Texas, is one of the largest and best equipped labor and time saving smelters in the world, upon the site of the old plant which was totally destroyed by fire in July, 1901. In the mesa portion of a town of about 2500 population on the banks of the Rio Grande river the smelter is located. This little smelter town, filled with a hive of workers, has its own public schools and buildings, its churches, electric lights in every house, stores, hospital and public building, and is a complete municipality in itself.

Approaching the smelter and town from the El Paso side the first things to attract the eye are the four tall smokestacks of brick, the compactness of the town including the plant itself, and the fortified appearance given it by the 3000 feet of brick flue walls on the south and west sides, and the steep rocky hills on the east side adds to the fort-like appearance of the town.

This plant although enormous in capacity is very compactly built, occupying not more than nine acres. Not a foot of space is wasted, although the matter of conveniences and room for work is plainly shown in every detail. The capacity of the plant at the present time is 40,000 tons of ore per month and is capable of indefinite expansion.

From the office immediately to the west a few yards, the first building is the blacksmith shop, built



General View of the El Paso, Texas, Smelter.

boilers is supplied from a storage tank of 75,000 gallons capacity sunk beneath the ground.

All the machinery in the entire works, including

iron floor which is absolutely fireproof. Connected with the boilers is a large octagonal stack, with a coping of brick of which it is composed, and runs up 160 feet.

Coming out of the power house on the north side is a steel pipe 5½ feet in diameter, resembling a big water main, connected with the blowers inside the power house by two small mains that come out on the north side of the plant and join together at a height of 14 feet, passing east to the end of the power house, thence south 350 feet into the parallel furnace building, connecting by distributing mains to the furnaces. This pipe is erected upon and supported by an iron structure of I-beam construction, and through it the air blast from the immense blowers in the power house is distributed to the nine furnaces. The furnace building is 240 feet in length. Material has been ordered for extending it 36 feet. It is a steel structure throughout, ventilators at the top entirely open on the north side from the ground about half way up. Here are the nine furnaces, seven lead and two copper, with space for two more. All the material, coke for fuel, charges of ore and fluxes, is carried to the top of the furnaces by electric trolley cars of eight tons capacity, each car operated by one man. The system here used is the third-rail system for the transmission of power. The cars are loaded from beneath the freight cars and from convenient system of bins, taken thence to the hydraulic elevator and again by electric power through a system of switches to any designated hopper and automatically dumped and returned. Alongside of this furnace building is a double-walled firebrick flue with connections from each furnace which leads to the two octagonal stacks, one of which is 225 feet high. The furnaces are fitted with convenience for handling the metal from the side and running it into the molds and the slag from the front into the large pots, thence wheeled away to where it is hauled off by the dummy locomotive.

On the south of the furnace building are the ore and coke bins, with elevated railroad tracks where the freight cars can be run and conveniently unloaded. The bins containing the different ores,



Appearance of Furnaces of El Paso Smelter After the Fire of July, 1901.

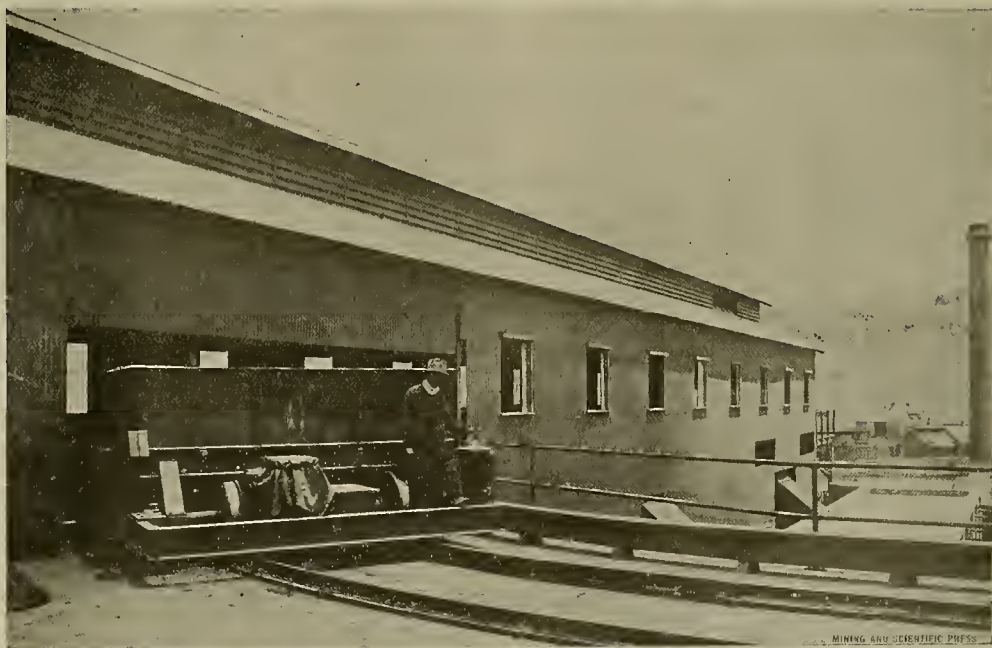
of steel, the machine shop built of brick on the north and the small building of steel for a copper and tin shop adjoining. The novel thing in the blacksmith shop is the long line of forges that are operated by a blast conducted by unseen pipes from the power house blowers.

To the west of these shops and foundry is the power house, in which is placed the machinery that furnishes the motive power for almost everything about the plant and town. This large building with a steel roof and iron floor contains four large Corliss engines of the cross-compound condensing type aggregating 2000 H. P. In this room are also two motors of 500 K. W. capacity, two of 75 H. P. each, and one 2000-light generator. From this house electric power is transmitted to every part of the plant, pump house, and for lighting the plant and town. The engine room has a fifteen-ton electric overhead crane capable of handling any piece of machinery in the room. All, or very near all, of the machinery is directly connected; all that is not is operated by small motors. The boiler room contains six 150 H. P. tubular boilers of high pressure, and space is provided for two more of the same type, or for one new type tubular that is being considered.

The pumping room contains the large hydraulic pumps for the elevator service used about the furnace room for moving the elevator that lifts the ore, coke, fluxes, etc. This room also contains the large fire pumps to be used in case of fire. These are in duplicate; in case of failure of one or more there are others to be called into service. Here, too, are the largest type water pumps for supplying and forcing water to the reservoirs in different parts of the plant and the town. These pumps are also in duplicate and there is no danger of a water famine at the smelter.

The sole fuel used in the plant for power development purposes is Beaumont oil. The oil for the

pumps at the river, is driven by electricity, no steam being used except in the engine room. All of the power plant given above except the pumping plant at the river is under one roof, with steel roof and



Electric Power Car at Smelter, El Paso, Texas.

cokes and fluxes are so arranged that the loading of the wheelbarrows and cars can be done by gravity and other conveniences for saving time and labor.

The next building on the south is the sampling building and works, another steel structure, fitted out with small roller mills operated by transmitted electric power. There is plenty of room for the proper and convenient sampling of ores and their preparation. In the northwest corner is the assay office.

South of the sampling department and ore bins comes the long low steel structure where the fourteen roasters are placed. These roasters are served by a large, square, red brick smokestack, making the fourth that carry away the noxious vapors high into the air. These roasters are considered sufficient for some time to come. Here is where many grades of the refractory ores are treated and the refractory elements driven off by the system of roasting when the ore is simplified, so to speak, and it can be treated by the ordinary processes of smelting and fluxing.

Along side of this building, which is about 400 feet long, is another double-walled flue extending the entire length of the building and leads to the square, red brick smokestack.

Down under the hill by the river is the pumping plant operated by electricity; this plant elevates the water necessary for the use of the plant and its inhabitants. The water is stored in elevated tanks about the plant and the five reservoirs.

The management of this plant deserve credit for their untiring energy and executive ability. F. C. Earl, the manager, has been ably assisted by the constructive and executive ability of T. S. Austin, the superintendent, and J. J. Ormsby, assistant.

Ores Which Are Deposited by Underground Waters.

J. M. MACLAREN.

These furnish the greater number of ore deposits of economic value. Their history will be, therefore, treated in detail as far as may be possible within the limits of this necessarily brief outline. We are indebted to Posepny for the first clear distinction between the regions of underground circulation, and between the work carried on in the respective zones. He divided the outer shell into a "lithosphere" and a "harysphere," the former being the region of "vadose" or shallow circulation, the lower boundary of which is the ground water level for the given region, and which is rarely, except in extremely arid regions, more than 100 feet from the surface. For the lower zone, the region of deep underground circulation, the term "harysphere" is unfortunate, since this zone, restricted as it must be in depth to less than 10 miles, is probably no greater in density, or, at any rate, inappreciably so, than the extreme outer shell of vadose circulation overlying it. Much preferable to denote this region is the term "thermosphere," suggested by Professor Le Conte. The depth of penetration of meteoric or surface waters in the zone of deep underground circulation is limited by the depths to which fissures extend, and this, again, is, for a given spot, dependent on the nature of the rock. Laboratory experiments have shown that under conditions of great heat and intense pressure apparently solid rocks can be made to flow, and whereas at and near the surface relief from stress in rock masses is obtained by fracturing and by settling along the fault lines so formed, there comes a point in depth where relief can be obtained by flexuring alone, the result of an actual flow of the rock particles, small indeed in relative measurement for each particle, but grand in the aggregate. It will, therefore, be clear that in this zone—the zone of flowage of Van Hise—there can be no fissure, and that the lower extremities of fissures extend no deeper than the upper portion of the zone of flowage, a depth certainly less than 10 miles.

The waters percolating in underground channels are undoubtedly—except, perhaps, in regions of recent volcanicity—almost entirely of meteoric or surface origin, and that they so circulate is due to the operation of the force of gravity, enabling the colder and therefore denser water from the surface by its superior weight to force the heated solutions from below to the surface. The latter move, as a rule, in the larger, more open channels, and hence move rapidly, with a temperature much higher than the immediately adjacent rocks, the smaller openings of which probably contain the descending waters. Posepny, appreciating the difficulties in the problem presented by the assignation of the same channel both to ascending and to descending waters, assumed that "the ground water descends in the deep regions through the capillaries of the rocks. At a certain depth it probably moves laterally towards open conduits, and, reaching these, it ascends through them to the surface." This assumption of the efficacy of capillary attraction was supported by a famous experiment performed by A. Dauhree, which apparently proved the power of capillarity in rocks to overcome pressure. But, as was shown by Osmond Fisher, the deductions based thereon, owing to a misapprehension of the conditions, were

erroneous, and there is now, indeed, much reason to doubt the efficacy of capillarity in the downward transportation of water, more particularly at depths where rocks are subjected to enormous pressure. But, having regard to the multiplicity and variety of underground fissures, there seems no reason to call in the aid of such a dubious agent on a large scale—at any rate as capillary force. The difference in density between connected columns of water at different temperatures is probably quite sufficient to account for all the observed phenomena in the circulation of deep underground waters.

As has already been seen, the region of underground circulation may be divided into two horizontal belts, and it will be of interest here to consider the work done in each, for it is along this line that the greatest advances in the science of ore deposits have been made. Considering, first, the condition of the waters in the lower belt, we find that they must be intensely heated. The average increment of temperature may be assumed to be 1° C. per 100 feet of depth. At a depth of 6 miles, below which extensive fissures are unlikely, the temperature of the waters must, therefore, be about 320° C., still below the "critical point," which is, for steam, 364° C. The pressure at this depth being far above that necessary to keep the water liquid, the work of underground solutions is that of superheated water, and how potent a solvent that may be the researches of Dauhree and more recently of Barus have shown us. Naturally the first work performed by waters in this region will be in their descent, for, gaining heat and pressure, and consequently an excess of solvent power with increase of depth, they will absorb a gradually increasing amount of mineral matter. For reasons which cannot be detailed here, the ascending waters are assumed to rise in the larger main channels, to reach which a lateral motion, occasionally horizontal, but generally with also something of a vertical component, must eventually be imparted to the circulating waters. During this movement a leaching doubtless also takes place. Here, then, we have a "lateral secretion," but far broader in scope and far more comprehensive than that of Sandberger, who restricted his lateral secretive action to the rocks immediately bounding the fissure in which the ore deposit is found. The waters, finding their way to the lowest point of their underground journey, emerge from the country rock into the main trunk fissures and commence their upward journey. They lose heat, and are subjected to diminished pressure, and, therefore, precipitate some of their contained mineral matter, a precipitation which is further facilitated by the heterogeneity of the solutions which are converging on the main fissure from all sides. Precipitation by emergent solutions from the walls of the fissure is a fruitful source of ore shoots or chimneys. This is, of course, better exemplified, as will be seen later, in the vadose region, or just immediately below it, than in the region of deep underground circulation. Finally, precipitation may also result from the influence of the fissure walls (e. g., the organic matter of the veins of Ballarat and of Gympie, Australia).

The characteristic compound deposited in the region of deep underground circulation is a sulphide of the metal, but tellurides and silicates may also occur. Sulphide deposition is always possible, although the waters are of meteoric origin, since long before they have commenced their upward journey they have been robbed of their oxygen by organic matter, and by the conversion of -ous into -ic salts—lower into higher oxygen compounds. The source of the metals in solution in deep fissures is, no doubt, primarily the small quantities contained in the volcanic rocks that have been extruded from the thermosphere into the lithosphere, though at the same time in any given fissure the metalliferous solution may be immediately derived in part or even wholly from sedimentary beds, the metalliferous content of which, of course, has been derived by an intermediate process of mechanical concentration from the degradation of igneous rocks. For long it was contended that the pyrites of igneous rocks was entirely secondary, but late research has shown that it must in many cases be regarded as a primary and essential mineral, and one which separated out on cooling. This observation is confirmed by the invariable association of sulphur and its compounds, gaseous and solid, with regions of active volcanic energy. The fumaroles and soffioni of Sicily and New Zealand are cases in point. That solution of the sulphides is facilitated by alkalinity of the percolating waters is a fair inference, since we know from laboratory reactions many of the sulphides of the heavier metals are soluble in solutions of the alkaline sulphides. The work done in the deep underground region may thus be axiomatically expressed: Meteoric waters slowly descend by force of gravity through minor openings, are transported more or less laterally to major fissures, in both cases gathering metalliferous content from the walls of the apertures through which they pass. They ascend through the main fissures and, losing their solvent power by reduction of heat and pressure, and by increased complexity of composition, deposit much of their mineral content as sulphides on the fissure walls.

The work of percolating waters in the region of vadose circulation is much more complex. The region extends from the ground water level to the surface,

and is, therefore, an extremely irregular belt, varying in thickness from zero to 100 feet, or even much more, according to the contour of the surface and the depth of the ground water level. This belt is characterized by the presence in solution of oxygen and carbon di-oxide. With these two gases a great variety of compounds is possible, the inquiry into the origin of which is further complicated by the action of organic matter on inorganic substances. We have, therefore, in this belt abundant chemical action, resulting in the formation and deposition of oxides, hydrates, carbonates, sulphates, etc.

Since we know that the surface of the earth is constantly changing with reference to sea level, it follows that the level of the ground water in a fissure is constantly falling or rising with relation to a given point in that fissure. While raising the ground water level would probably have but little effect on ore bodies, lowering it exposes to oxidation the sulphides of that portion raised above level. And as the waters of the vadose region have, generally speaking, a downward or a lateral movement, or one compounded of both, the metals in solution are carried down to or below the ground water level, and there the oxides, etc., are reduced to and redeposited as sulphides. The reduction is not necessarily the result of the decomposition brought about by organic matter, but more probably results from chemical interaction between the descending and the comparatively stagnant solutions below ground water level. There is thus a secondary enrichment of this zone, and if a region be conceived as undergoing continuous elevation, it follows that as its vein fissures rise there will be progressively increasing enrichment of the sulphides at its ground water level. This, indeed, is the gist of the modern view of the secondary enrichment of ore deposits, a process to which it would appear that most of the economically valuable ore deposits have been subjected. This theory has, moreover, a very important bearing on the permanence in value of ore deposits where pursued in depth. In many cases it furnishes an adequate explanation of the impoverishment in depth of fissure veins that have yielded well from the surface to depths of even 1000 feet or more, for it seems well established that the process of secondary enrichment may be carried far below ground water level. This enrichment, which is actual and positive, must be clearly distinguished from that process of secondary enrichment which takes place in the region of oxidation, where an ore deposit may be relatively enriched by the subtraction of its more soluble and worthless components by percolating chemically active waters. In this theory also lies an explanation of the restricted occurrences of "bonanzas," "pay streaks" or "patches." Since the movement of the solutions subsequent to their enrichment is dependent entirely on structural conditions, it follows that if the vein be laterally permeable above ground water level then, as will have been seen from the discussion of the movement of underground waters, the cooler descending waters will travel by these fissures and will at a lower point emerge on the fissure from which it departed at a higher level. If these emergent solutions issue from a vertically disposed fissure, the resulting enrichment will take the form of a steeply dipping "chimney" or "bonanza." In the absence of lateral fissures above ground water level the enrichment will take place along a horizontal zone coincident with the surface of the ground water.

It will, therefore, be apparent that a comprehensive sub-classification of the deposits resulting from the movements of underground waters must include all the phenomena indicated above. Again following Van Hise, the ensuing division of group B may be adopted:

(a) Ores which at the point of precipitation are deposited by ascending waters alone. These are generally sulphides, but may also be metallic, or tellurides, silicates or carbonates.

(b) Ores which at the point of precipitation are deposited by descending waters alone. They are oxides, carbonates, chlorides, etc.

(c) Ores enriched by a secondary concentration. Below the ground water level the ores in this division will be sulphides, tellurides, etc., and above they will be precisely similar in nature to those in group (b.)

A New Colliery Explosive.

A new device is reported to have been successfully tested in several collieries in Lancashire, England, to add to the simplification of coal mining. Under existing conditions, the coal, after it has been undercut, is brought down by an explosion of gunpowder. The new plan brings down the coal by water power exercised throughout a hydraulic cartridge and obviates wasteful shattering of the fuel. Made of steel, the cartridge is 20 inches in length. Along its sides are orifices, each of which admits a pressure of three tons per square inch, the total pressure being over sixty tons. When inserted into the hole bored into the coal to be operated upon, the cartridge is connected with a small hand pump. In a few minutes after the apparatus has been at work the coal breaks up and comes down in great blocks. There are no clouds of dust such as are caused by the gunpowder method, and the entire operation is carried on without danger to the workers. About 1½ pints of water

are used in the operation, and, as the liquid returns to the tank, it can be repeatedly used. Although the initial expenditure is greater, the cartridge method is more economical than the system now in vogue. It reduces the cost of labor, prevents waste and secures rounder coal. One colliery proprietor who has adopted the invention for use in three mines is reported to compute that each cartridge saves \$75 per week.

De Lamar, Nevada, Mines.

Written for the MINING AND SCIENTIFIC PRESS by J. W. NEILL.

The De Lamar mines are located in the Meadow Valley range about 30 miles by wagon road from Calientes. The rock formation is quartzite, uptilted and dipping to the north and east on an incline of 30°. The quartzite is cut by three porphyry dikes which strike approximately east and west, and by another porphyry dike which strikes approximately north and south with the strike of the quartzite heels and dips at an angle of 68° to the west. The ore bodies make at the intersections of the two major east and west porphyry dikes and the north and south porphyry dikes. This latter has been the seat of profound fissuring and this movement has fractured the quartzite of the surrounding country on both sides, producing two parallel fissures, which are similar in strike and dip to the black porphyry fissure itself. The east and west porphyry dikes are approx-

imately 300 feet apart at the nearest point, and at this point the black porphyry, which is the main north and south fracture, cuts through both porphyries. In relative age the east and west porphyries are probably the younger. The quartzite is most profoundly shattered in the neighborhood of the corners of these three porphyries, and in this locality the mineral solutions which have followed the fissuring and centered communities quartzite have been most active. The re-

less small pieces has been recemented by the mineral solutions into a compact mass of silica, thus forming bodies of extreme hardness. These ore bodies have had great area, in places over 100 feet square, and are developed from the surface to the 700-foot level, and are now being developed below this level. In addition to these shoots of ore in the quartzite there are several known shoots developed on the main black porphyry dike and partaking of the nature of regular fissure vein ore shoots differing only in that the quartzite adjoining the porphyry has been mineralized to a greater or lesser extent sometimes on the hanging and sometimes on the foot wall side of the dike, but without any well developed walls to the ore deposit itself. Further than this at least two of the parallel platings or fissures have developed ore bodies, and one of these promises to be of great magnitude and importance. This is the new "Hog Pen shoot" which lies to the south of and 700 or 800 feet away from the other and older ore bodies. It is from 12 to 18 feet in thickness and several hundred feet in length on the strike of the fissure, and is of peculiar interest and importance aside from its commercial value, which is great, as evidencing the fact that the ore bodies will make in the fissures in the quartzite away from the black porphyry itself.

The April Fool mine has been developed on another series of fractures which are parallel to the main black porphyry fissure, and they resemble to a marked degree the ores produced in the recently discovered Hog Pen shoot of the De Lamar. The ores of the quartzite ore bodies are peculiar in that they

on this property has followed this formation to a depth of 300 feet, and the promises of the future are bright. From the surface of all these properties very rich ores were taken out and much of it shipped by wagon to Milford and thence to the smelters at Salt Lake. These ores abounded in free gold, and to this fact the development of the camp is largely due. The treatment of the lower grades called for the piping of water and building of mills. The efficiency of the method employed, viz., cyaniding, is vouched for by the fact that fully 90% of the metal values were extracted. The camp has produced a gross valuation in the neighborhood of \$13,000,000, and of this fully one-half has been in dividends, which is certainly a very large proportion. The present consolidation of interests under one company and one management, with the enlargement of mill facilities and cheapening the handling through the introduction of electric power, will result in a renewed activity and renew a large production. The plans now perfected will result in an output from this supposed-to-be-worked-out camp in the neighborhood of \$125,000 to \$150,000 per month.

Treatment of Sulphides.

For some considerable time metallurgists at Broken Hill, Australia, have been experimenting on the metallurgy of lead and silver. Messrs. Carmichael and Bradford have a new desulphurizing process which affects the treatment of concentrates. The process has been tested on a large scale, and found



De Lamar Mines

April Fool Mines

De Lamar, Nevada.



View of Old De Lamar Mill, De Lamar, Nevada.

imately 300 feet apart at the nearest point, and at this point the black porphyry, which is the main north and south fracture, cuts through both porphyries. In relative age the east and west porphyries are probably the younger. The quartzite is most profoundly shattered in the neighborhood of the corners of these three porphyries, and in this locality the mineral solutions which have followed the fissuring and centered communities quartzite have been most active. The re-

show no evidence to justify their commercial character. It is a silicified and often glassy mass of quartzite which, under the microscope, shows that it is very largely a readjusted, or at least a recemented quartzite. The gold contents in these ore bodies is contained in exceedingly minute form, is practically never visible to the naked eye or in the pan, but has yielded readily to the treatment by cyanide. In the upper levels, particularly in the stopes of the black

porphyry fissure, considerable native tellurium has been found, and strange to say this mineral is almost barren in gold, which is contrary to local belief, but this mineral has been associated with some of the richest ore bodies in the mine and is an indicator of the origin of the gold from tellurides. In some places in these stopes tellurides of gold have been found and it is probable that the gold throughout the mine has been and is more or less in this form. In the new Hog Pen shoot the ore differs from the old parts of the mine in that it is more stained with iron and yields considerable gold to amalgamation, which the old mine did not do. The ores of the April Fool fissure system are stained with iron oxide, and, moreover, carry considerable silver values, thus differing from the De Lamar mine. In this mine in several places the undecomposed iron pyrites has been found in small patches where it has been protected by a clay gangue. Otherwise the ore is oxidized to the depth of 1100 feet, and at this depth the values are still of a commercial grade.

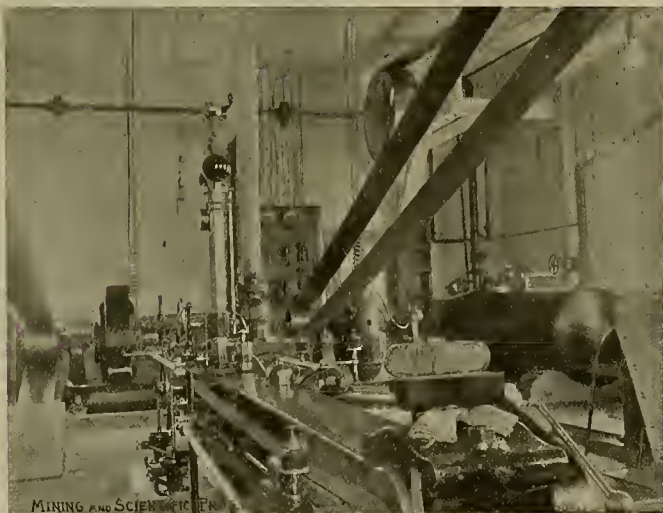
Differing from both the De Lamar and April Fool mines the ores of the Magnolia group occur in a porphyry dike at the contact with quartzite. These ores differ in character from the other two mines in that they are heavily stained with manganese and show a heavy percentage of free gold, and contain silver values which usually average in the neighborhood of an ounce in silver to a dollar in gold. Development

satisfactory. The time occupied in preparing concentrates by the new process is one and one-half to two hours, the old roasting stage being done away with.

In the Carmichael-Bradford process the use of gypsum is the chief factor. The process is as follows: The gypsum is first dehydrated—turned into what is really plaster of paris. It is then well mixed with the sulphide concentrates (or slimes), the percentage of gypsum used being about 20%. Next, water is added, and when the mixture is thorough it is set out to dry, crushed small to an average size of $1\frac{1}{2}$ to $\frac{3}{4}$ inch. The dust is sieved out and set aside to be again mixed. After being crushed the mass is ready for the converter, which, in the experiments, has been of cast iron. The size of the converter used was 3 feet 9 inches across the top and 3 feet 1 inch deep, V-shaped. The bottom plate is well covered with red-hot coal, of equal redness all over to a depth of 2 inches. The pot is filled with the rough mixture—the rougher at the bottom and the finest on top—a hood is placed on the top and $\frac{1}{2}$ ounce of air turned on. After a quarter of an hour the air current is increased to $2\frac{1}{2}$ to 3 ounces, which is kept going until the pot is cooked. The pot used in the experiments contained 12 cwt., and the average time occupied in a thorough cooking was one and one-half to two hours. Slimes take no longer to treat than concentrates.

The loss in the Carmichael-Bradford treatment is of silver nil and of lead 0.7%. In all the initial experiments the highest loss of lead was 0.7% and the lowest was 0.2%. Most of the sulphur is driven away. The highest residue of sulphur obtained in the experiments was 5%; in a number of assays only 1.5% was shown. It is desirable to allow some sulphur to remain in order to facilitate the smelting, so it will be advantageous to allow about 5% of sulphur to remain.

The secret of the process is in the use of the gypsum and the knowledge of the percentage necessary for the various concentrates and the proportional sizes of the machinery necessary for the charges. The machinery is simple—a converter and a blower, the latter of the ordinary type in every-day use. The air is conveyed into the converter from the bottom. When the process is used on a large scale various mechanical devices will be adopted for saving time and labor in respect of charging, tipping, clean-



Section of Engine Room, De Lamar Mill, De Lamar, Nevada.

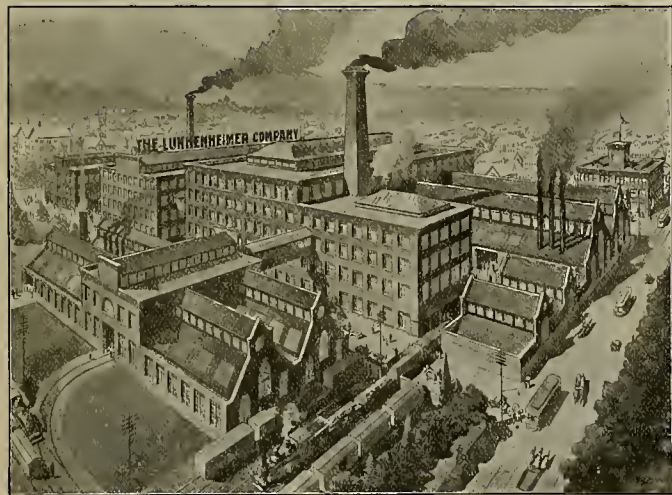
sult has been the production of numerous brecciated ore zones which filled up the corners where the north and south dike has crossed the east and west dikes. Thus, to-day, these well-known ore shoots have been developed in six of these eight corners, and the other two corners give promise of producing equal results in the future. These ore bodies have evidently been mineralized through the openings at the corners where the dikes make their crossings, and the quartzite which had been broken into more or

ing and so on. The product is a rough, homogeneous mass. The difficulties stated to be overcome are incomplete desulphurization, loss of metals by volatilization and the fine condition of metals to be fed to the blast furnaces.

The process may prove valuable in the treatment of zincs. Further value may be derived in distilling sulphuric acid, as the sulphur from the pots can be liquefied and turned into the acid.

Lunkenheimer New Works.

The Lunkenheimer Co. of Cincinnati, Ohio, manufacturers of brass and iron goods and specialties for engines, boilers, etc., such as brass and iron valves,



The New Works of the Lunkenheimer Company.

whistles, injectors, lubricators, oil and grease cups, etc., on October 25th opened their new works to about 3000 visitors and have moved from their old quarters on Eighth street. The five buildings represent an investment of \$300,000. They occupy three acres of ground, three acres additional providing for future extension of the business. These factories are near Brighton station in a section of the city called Fairmount, within 2 miles of the center of the city.

A novel feature in the main building is the heating system, inasmuch as the hot air travels through the fourteen large hollow columns which support the floors around the area in the center of the building. These columns have openings on each floor to distribute the air; the bases of the columns are connected with a huge fan by means of tunnels under the basement floor. By this construction the usual galvanized iron air pipes are done away with and adds greatly to the simplicity of the building.

The foundry has overhead track system for carrying material, smelting furnaces burning crude oil and pneumatic appliances, such as are used in latest foundry practice.

The illumination is furnished by the Nernst lamp. Owing to the arrangement of the lamps, the distribution of the light is even and without shadows. The lamps are so arranged that sufficient illumination is secured without providing each operator with an individual light.

The office building is a three-story pressed brick structure 50x80 feet with modern equipment, the second floor being occupied by the draughting and engineering departments and the third by advertising department, as well as a laboratory and photograph gallery. The business was founded in 1862 by the late Frederick Lunkenheimer and has grown to large proportions, now employing over 700 men. With increased facilities the company expect to extend their line and take up many new engineering specialties. The company's trade is domestic and foreign, being distributed largely through jobbers. They also have a branch store in London, England, and an office in New York City. The company have placed many orders for additional tools and machinery, which are being installed in their new quarters.

Pyritic Smelting of Gold.

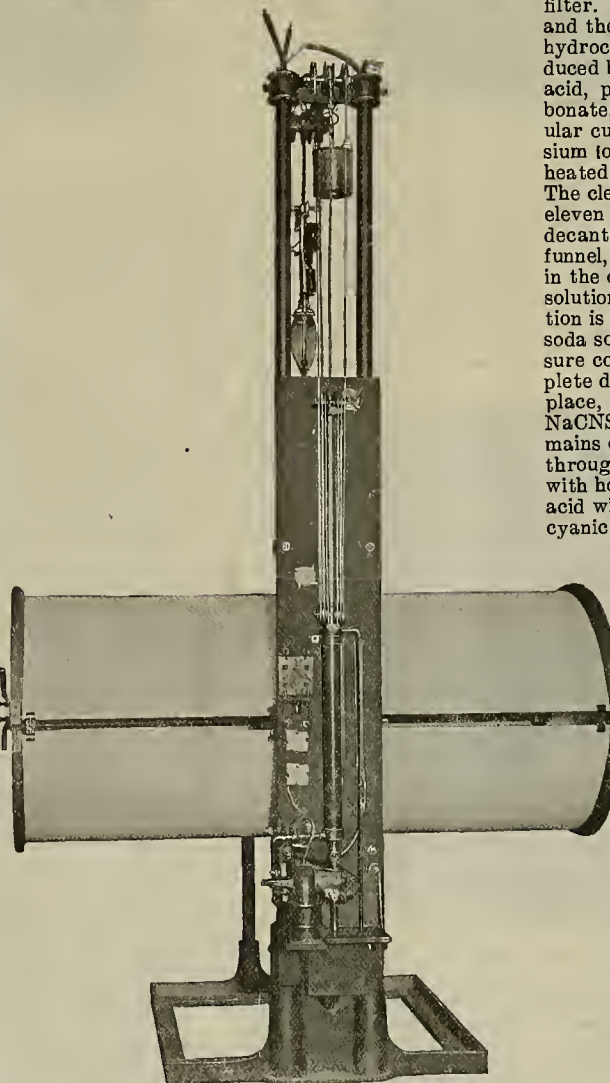
In a paper recently read before the Engineers' Society of Western Pennsylvania, W. F. Koch claims that sulphur, so far from being a deleterious ingredient, may often be a positive advantage if the older methods of treating such ores are abandoned, and the gold is obtained by pyritic smelting. In this case the sulphur, instead of being wasted by roasting it off, serves as fuel, replacing an equivalent quantity of coke. The ores charged into the furnace are quartz ores, lime ores, quartz and lime ores, quartz and aluminous ores, all containing gold in varying amounts and a small percentage of copper. Mixed with these are the pyritic ores, ranging from pyrites to pyrites with quartz, quartz with pyrites, lime and pyrites, and quartz, lime, alumina and pyrites, which form a fairly representative list of refractory gold ores. The furnace used is a simple water-jacketed

blast furnace, having provision for collecting the waste heat which is utilized for warming the blast. This blast should be just powerful enough to get a hot zone right at the tuyeres, a greater supply of air being a disadvantage, since there is then a tendency to set up reactions in the descending column of ore and fuel. For similar reasons the height of ore above the tuyeres should not be too great. The charge consists of a mixture, in the following proportions of ores, such as those already mentioned: Pyrites 15%, quartz ores 45% (these usually contain lime and pyrites), lime ores 20%, low grade matte 10%, slag 5%, coke 5% to 3%, and from 1% to 2% of charcoal, which costs at the furnace in question about half the price of coke. The charge of fuel added is thus about 5% of the total.

While the furnace is at work slag is run off continuously, while the matte which contains all the gold, silver and copper in the original charge is tapped out from the bottom of the furnace as required. When the copper contents of such matte amount to 45% it is standard, and can be sold to the large copper refiners, who will extract from it the gold and silver. If this standard is not reached the matte is passed again through the furnace till it is enriched to the necessary degree. The slag contains only traces of gold and silver and is thrown away. A complete plant, capable of treating ten tons of ore per day, and yielding three to four tons of standard matte, costs, it is stated, but a couple of thousand pounds, and stamp mills are not required, since it is unnecessary to pulverize the ores before passing them into the furnace. Mr. Koch holds that this method it likely to take a great development in the future, and will, with the cyanide process, be responsible for a large proportion of the world's output of gold. He thinks that the process of extraction by chlorination will, on the other hand, tend to disappear, as it is only suitable when ores free from lime and water, also lime free, are both available, though at Cripple Creek this method is so far the favorite.

Blue Printing by Electricity.

Time was when the familiar "blue print" could



Cylinder in Horizontal Position for Inserting or Removing Tracings or Paper.

only be produced by sunlight, but advancing science enables one now to dispense with sunlight and make

blue prints regardless of time or weather. Herewith is partially illustrated an apparatus for such work, which consists of a cylindrical printing frame, composed of two heavy curved plates of glass, bedded in soft material in an adjustable, though rigid frame, together with two tubular uprights which support the arc lamp and automatic drive mechanism. This drive operates the lamp, having means for lowering it through the cylinder and then automatically raising it again to its former position. The cylindrical frame revolves on trunnions, so that it can be swung to a horizontal position, which is the most convenient method for inserting or removing tracings and paper from the frame.

In operating, the cylinder is revolved to a horizontal position, and the tracings and sensitized paper are placed around the outside of the cylinder, being confined by stout canvas covers, which are drawn tight by turning a lever, thus insuring perfect contact between tracings, sensitized paper and glass. The cylinder is then swung to the opposite horizontal position and the same manipulation repeated, after which it is returned and locked in vertical position and is ready for printing. By simply touching a lever the arc lamp starts in its descent through the center of the cylinder at a speed which can be regulated to suit the sensitiveness of paper employed. When the lamp has reached the lowest point of printing surface, it automatically reverses its motion and quickly returns to its original position above the cylinder.

The device is manufactured by Eugene Dietzgen Co., 181 Monroe street, Chicago, Ill.; 119-121 Twenty-third street, New York City; 508 Market street, San Francisco, Cal.

Notes on the Estimation of Copper by Potassium Permanganate.

H. A. Guess, in the Jour. Am. Chem. Soc., describes a modification of the ordinary thiocyanate method of estimating copper in ores, tailings and concentrates, doing away with asbestos filtering material, and using filter paper well extracted with hydrochloric and hydrofluoric acids instead. The author describes the exact process as follows:

From one to five grams, depending on the material for assay, are digested in an eight-ounce flask with nitric and hydrochloric acids, together with a few drops of sulphuric acid, to get rid of any lead present, the excess of acid is boiled away, the acid solution diluted, filtered and the residue well washed on the filter. The acid filtrate is neutralized with ammonia and then rendered just acid by a few drops of dilute hydrochloric acid. The acid cupric solution is reduced by an excess of sodium sulphate, or sulphurous acid, previously nearly neutralized by sodium carbonate, and the copper precipitated as white granular cuprous thiocyanate by a slight excess of potassium or ammonium thiocyanate. The mixture is heated to boiling, the precipitate settling rapidly. The clear supernatant liquid is decanted through an eleven cm. filter, and the residue, after washing by decantation, is finally washed with hot water. The funnel, with its filter and precipitate, is now placed in the original precipitation flask, and a boiling 10% solution of caustic soda poured through. The operation is repeated with a further amount of the caustic soda solution, the filter being filled each time to insure complete contact with all the precipitate. Complete decomposition of the cuprous thiocyanate takes place, the equation being $\text{CuCNS} + \text{NaOH} = \text{CuOH} + \text{NaCNS}$. The insoluble yellow cuprous hydroxide remains on the filter, the alkaline thiocyanate passing through. The filter and contents are well washed with hot water, the alkaline filtrate made decidedly acid with dilute sulphuric acid and the liberated thiocyanic acid titrated with standard potassium permanganate at the warm temperature given it by the hot water washing. The chief imperfection of this method lies in the slight solubility of cuprous thiocyanate in the solutions present.

The theoretical conversion factor for the permanganate from iron to copper is 0.1892, while its value as actually found by standardizing the permanganate solution against a weighed amount of copper, by this method, was .1920 of the iron value of the permanganate solution. This difference is due to the slight solubility of the cuprous thiocyanate and the consequent incomplete precipitation.

By standardizing the permanganate solution always against pure copper, under same conditions as the regular assays, this error of solubility is, for all the technical purposes, eliminated. The slight action of the hot caustic alkali solution is another imperfection of the method. This error is constant for the same kind of filter. A blank must be run for this correction. The author finds that on an eleven cm. filter it amounts usually to 0.3 c.c. potassium permanganate, of a strength of 1 c.c. = 2 milligrams copper.

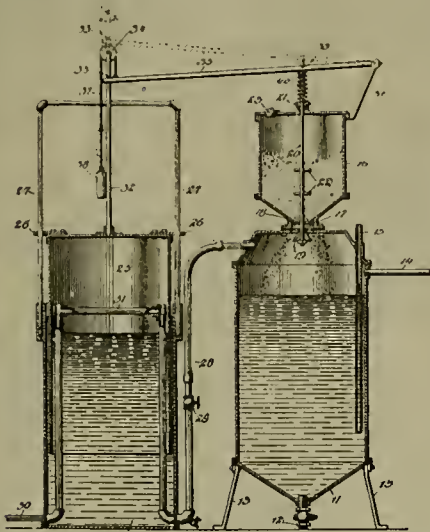
The author states that this method is more accurate than, and distinctly superior to, either the iodide or cyanide method for small or fractional percentages of copper.

Mining and Metallurgical Patents.

Patents Issued November 4, 1902.

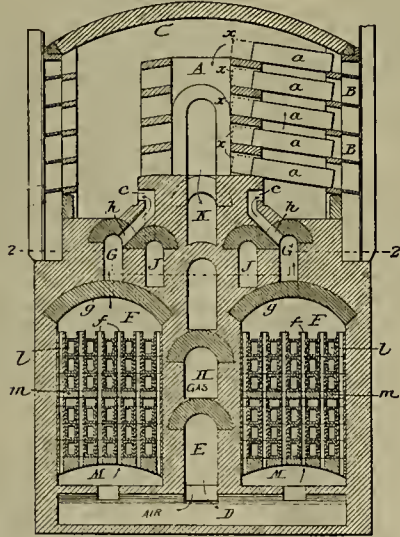
Specially Reported and Illustrated for the MINING AND SCIENTIFIC PRESS.

ACETYLENE GAS GENERATOR.—No. 712,474; D. Barnard, Bakersfield, Cal.



In gas apparatus, combination with gasometer having movable member, provided with upright stem having offset stop intermediate its ends, of generating chamber, carbide reservoir having communication with generating chamber, valve controlling communication, provided with stem that projects above reservoir, lever pivoted at one end and attached at intermediate point to valve stem, free end of lever bearing against stop, pulley journaled upon stem above stop, flexible cord or cable secured to free end of lever, passing over pulley and weight attached to free end of cord or cable.

MUFFLE FURNACE.—No. 712,502; Convers and De Saulles, South Bethlehem, Pa.



Retort furnace provided with two retort chambers or compartments having gas and air inlet flues at bases, having central downtake, air-distributing chambers for air inlets, gas distributing chambers for gas inlets, air-regenerator chambers supplying air-distributing chambers, horizontal flue for waste products of combustion communicating with central downtake, located between gas distributing chambers, horizontal flue communicating with heating flues of air-regenerator chambers.

HOISTING HOOK FOR MINERS.—No. 712,959, C. F. Pohlman, Spokane, Wash.



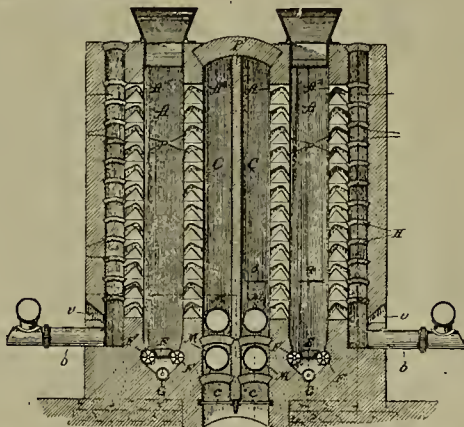
Device of class set forth comprising pair of jaws pivotally connected at upper terminals having lower interlocked hooked terminals freely movable in relation to each other, shoulders on outer edges above the hooked terminals, shoulders having combined transverse extent greater than combined overlapped extent of jaws at distance below shoulders, a link embracing jaws freely slidable over latter, link being normally loosely located below shoulder but having greater length than distance between outer terminals of shoulders when jaws are closed.

ROCK DRILL.—No. 712,592, J. Puechagut, Black Diamond, Wash.



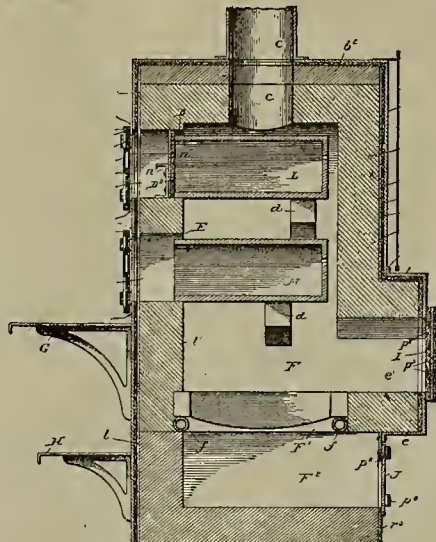
In device of character described, spindle, nut threaded thereon, multiple gear wheel journaled on trunnion of nut, second gear wheel mounted on spindle, splines located within grooves of spindle, second-named gear wheel, friction rolls on splines bearing against sides of grooves of spindle and end of nut, yoke connecting splines, spring carried thereby to engage any one of several notches in hub of second-named gear wheel whereby gear wheel is adjusted in its position with relation to nut, so as to mesh with one or another of series of teeth on multiple gear wheel.

ORE FURNACE.—No. 712,812; W. A. Koneman, London, England.



In an ore furnace, combination of vertical combustion chamber divided by horizontal baffles into passages each opening into that immediately above it, whereby products of combustion in rising through chamber traverse in succession all passages and whole length of each passage, vertical exhaust chamber, walls spaced apart to afford combustion, exhaust chambers formed with half-brick sections each provided on one side with V-shaped recess, recessed surfaces facing each other, forming ports p, and one chamber between walls provided with feed inlet at upper end with discharge outlet at its base.

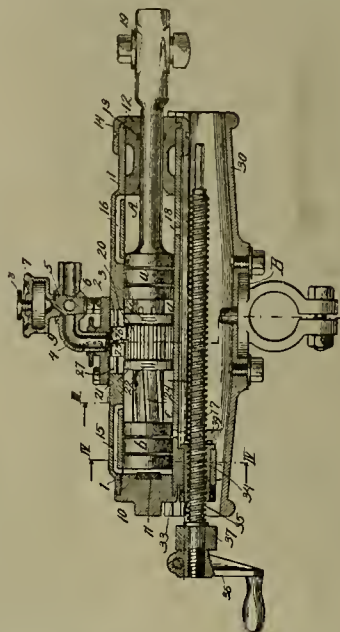
FURNACE.—No. 712,636; C. S. Batchelder, Spokane, Wash.



A muffle furnace for purpose stated, comprising

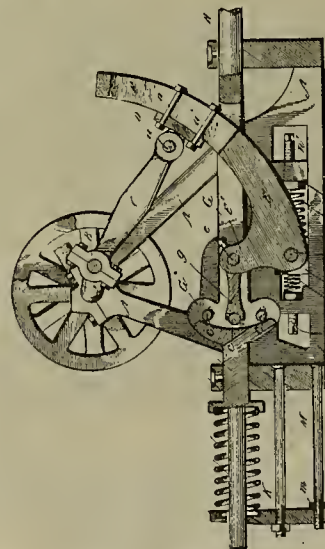
metallic casing, lining of refractory material, asbestos packing interposed between metallic casing and refractory lining, solid fuel burning firebox having lateral stoking opening, firebox and opening being located in base of furnace, plurality of muffle chambers in vertical alignment with firebox, contractions between muffle chambers, and doors for muffle chambers arranged to admit air thereto.

VALVELESS ENGINE FOR DRILLS.—No. 712,597; R. L. Rickman, Denver, Colo.



In valveless drill, cylinder having suitable inlet, admission and exhaust ports, piston having reduced central portion adapted to control ports, ratchet ring located upon reduced central portion, corresponding spiral ribs and grooves on inner wall of ring and on piston, pawl engaging ratchet, whereby piston is reciprocated and is intermittently rotated. In combination, piston A having grooves 24 thereon, ratchet 20 having ribs 23, pawls 25, 26 in connection with ratchet, and means for reciprocating piston.

DEVICE FOR OPERATING CONCENTRATING TABLES.—No. 712,934, A. W. Johnson, Aspen, Colo.



Device for converting rotary motion into reciprocating motion, comprising crank shaft, connecting rod, rocking arm connected thereto, fulcrumed at lower end, having projection above its fulcrum, yoke made in one piece embracing rocking arm having seat with three bearings, and thrust block for connecting any one of bearings to projection of rocking arm, one end of yoke being extended in form of stem and bearing compression spring, vertical abutment bar for spring receiving and guiding stem, two parallel anchorage rods for abutment bar connected to it.

PROCESS OF TREATING ANODE RESIDUES.—No. 712,640; A. G. Betts, Troy, N. Y.

Process of treating anode residues containing lead, copper, antimony and arsenic from the electrolytic refining of lead alloy, which consists in combining part of the lead, copper, antimony and arsenic present with chlorine gas, of removing them as chlorides in solution and of distilling off the water, antimonious and arsenious chlorides from solution.

Mining Summary.

Specially compiled and reported for the
MINING AND SCIENTIFIC PRESS.

ALASKA.

(Special Nome Correspondence).—Operations on the creeks are suspended; the season was very satisfactory, freezing weather commenced only to-day. Sluicing was done on many creeks in the Nome district up to the 18th, the working season actually lasting from June 15 up to October 19. The very dry weather was somewhat counter-balanced by the new ditch system that has been inaugurated this season, and the next season will be in all probability a still greater activity in the construction of ditch systems on the whole peninsula.

The result of this summer season's work is variously estimated at from \$6,000,000 to \$7,000,000. A carefully prepared table of the estimated output by creeks and districts is as follows:

Nome District:	
Anvil creek and benches.....	\$1,250,000
Glacier creek and benches.....	500,000
Dexter creek and benches.....	550,000
Rock creek and benches.....	75,000
Oregon creek and benches.....	50,000
Buster creek and benches.....	25,000
Nome river and all other tributaries.....	55,000
Bourbon.....	65,000
Dry creek and tributaries.....	75,000
Cooper's gulch.....	15,000
Bangor and Boulder.....	12,000
Wonder, Holyoke and Saturday.....	25,000
Peeluk creek.....	35,000
Otter creek.....	45,000
Solomon river.....	75,000
Big Hurrah.....	75,000
Kasson creek.....	100,000
Shovel creek.....	10,000
West creek.....	5,000
Mystery creek.....	35,000
Small creeks.....	250,000
Nome beach.....	200,000
Council District:	
Ophir creek and tributaries.....	1,500,000
Cassa de Pago and tributaries.....	75,000
Top Kock.....	150,000
Spruce creek.....	15,000
Small creeks.....	100,000
Kougrock and Fairhaven Districts:	
Kougrock and tributaries.....	\$ 45,000
Immatchuk.....	75,000
Candle creek.....	150,000
Iron creek.....	45,000
Gold Run.....	75,000
Small creeks.....	45,000

Total.....\$5,802,000

Winter work will be very extensive the coming season. Preparations are made to open up benches on Peeluk and Otter creeks, which have shown up some very good prospects. It appears from the discovery of No. 3 Peeluk creek, that the beach extended at an earlier period much farther inland and deposited beach pay parallel to the present shore line on the high benches and tundra, the pay having been traced for a considerable distance east of Nome, and the probabilities are that very good results will be obtained from the winter's operations.

Some good paying creeks have been discovered at the St. Lawrence bay, Siberia. The Mining & Trading Co. holding the concession from the Czar is under very heavy expense, and success and encouragement in opening up the vast undeveloped country should be what they deserve. Before close of navigation I shall write one more letter.

Nome, Oct. 20.

Director of the Mint Roberts makes public final statement of the gold output of Alaska for the last ten months. These figures, based on the receipts at San Francisco, Seattle and the Selby refinery, show a total of \$18,870,075, as follows: Klondike (Canadian), \$13,861,095; Nome, \$5,008,980. The total is over \$4,000,000 in excess of the Alaskan output for the entire calendar year 1901, the figures for that year being \$14,675,675. In the output for the last ten months is included \$250,000 expected to arrive from the Klondike before January 1, and \$1,350,000 expected from Nome.

ARIZONA.

COCHISE COUNTY.

The Black Diamond Copper Co., 12 miles from Pearce, are preparing to blow in their 100-ton smelter.

The Calumet smelters at Douglas are being completed. Superintendent Merrill says: "We will blow in by Nov. 10th."

In the vicinity of Bisbee the Copper Queen is putting out copper bullion and pushing development and prospecting work.—The Calumet & Arizona Co. is getting ready to transport ore to its reduction works at Douglas.—The Calumet & Pittsburg is sinking its shaft.—At the Solomon Springs Copper Co.

Superintendent Palmer is pushing development work.

GILA COUNTY.

Troy reports a heavy flow of water in the Alice shaft. The ore body on the second level of the west drift of the Alice has improved greatly—carbonate and glance. The black sulphide ore in the second level of the Sisson continues to improve. The electric hoist at the Buckeye mine is in operation.

GRAHAM COUNTY.

Near Safford Superintendent Stafford continues in charge of the Horseshoe & Gila Valley property, which has been transferred to a new organization, the Federal Mining Co.

Eighteen miles from Pima, J. D. McEnery has sold the Kin-e-chy group of twenty mining claims to Detroit, Mich., men, who will organize a company and commence work on the property within three months.

Six new converters have arrived at Clifton for the Arizona Copper Co.

The Federal M. Co. has been organized to work mines in the Lone Star district, headquarters at Safford. Its property consists of the San Juan and Great Eastern groups of mines. Its incorporation absorbs the Gila Valley Copper Co. and the Horseshoe Copper M. Co. The members of the company are New York people. J. M. McCollum is the local representative of the company.

MOHAVE COUNTY.

At Todd Basin Superintendent J. D. McNab will put a 50-ton mill on the Oro Plata mine.

At the Gold Road mines Superintendent Stevens has 100 men at work.

J. W. Morgan, superintendent Golden Gem mine, Cerbat, tells the Kingman Miner that the mine shows good ore in the lower levels and that, when a reduction plant is installed, there will be enough ore to keep it running.

The mines of San Francisco mining district are increasing their force. The Gold Road mine is now employing 120 men and the Leland has 28 miners on the payroll. The other mines have doubled their forces during the past month and are employing all who apply for work. The Gold Road Co. is working on the new wagon road over the mountain from Little Meadows; another force is laying pipe and erecting buildings at the foot of the mountain.

North of the Colorado river the various mining companies are arranging for an active winter's work. The leaching plant in the Buckskin mountains is doing good work; the company is figuring on an extension of the plant. The Grand Gulch people are opening the mine below the 400 level. The permanent formation has not been reached in any of the mines. The ore bodies lie in the sandstone in large deposits and have little connection with each other.

PINAL COUNTY.

The Republican says that the Arizona Copper Mountain M. Co., near the Gila river, 6 miles from Kelvin, has determined to erect a plant for the reduction of the copper ore which has been developed in the Copper Butte. The railroad line is a mile from the main workings of the company.

SANTA CRUZ COUNTY.

At Oro Blanco the Old Glory stamp mill is in working order for Brand & Ish, who have bonded the mines and mill. The ore is taken from the Old Pedro Pellon mines. Fifteen men are working in the mine night and day. In the 60-foot shaft they have 4 feet of ore which runs from \$15 to \$75 per ton gold. The only drawback is lack of water; there has been but little rainfall in that section and the mill dam has about enough to run a month. The water is being saved as it is carried back again into the dam after being used in the mill.

YAVAPAI COUNTY.

Patenting of the Verde Queen group of twenty-eight claims is completed. The property is equipped with a 30-ton smelter, which has turned out sixty tons of bullion during its operation. The property is reported sold for \$250,000 through the efforts of J. A. King, who for two years was superintendent. The old company was composed mostly of New York people. Through this sale the Verde Queen becomes the property of Massachusetts men. Prospect work on the Verde Queen shows one ore body 300 feet long, 60 feet in width, which samples 4% copper. It is the intention of the new company to do extensive development work.

Jerome reports that preparations are nearly completed for starting the United Verde smelter. On the 15th two of the six furnaces will be blown in. W. A. Clark, the owner, ordered this smelter closed ninety days ago, and has put in the time enlarging the smelting plant. Before the shut-down the smelter handled 1200 tons of raw copper ore every twenty-four hours. Four of the 200-ton furnaces

have been taken out and replaced with 500-ton furnaces. The increase in capacity will now permit the handling of 2500 tons of raw ore. The run of the mine is about 8% copper, which makes the output of copper from Jerome about 200 tons every twenty-four hours.

Last Saturday, says the Prescott Courier, two men went down the shaft of the Little Jessie mine to figure on a contract. When they reached the 500-foot level they were caved on. One of the men, named Pickering, was pinned down in some water and drowned. The other man was seriously, if not fatally, injured. He is now being cared for at the McCabe hospital.

YUMA COUNTY.

A company composed of San Francisco, Los Angeles and Arizona men is being organized to work the Gila City placer grounds. These gold fields have been worked in recent years by Mexicans and Indians, who can make \$1 a day panning gold, but are now almost exhausted for working in a small way, and the new company proposes to work them on such a large scale as to extract the gold at a minimum expense. They propose to take water from the Gila river and pipe it from a reservoir to the fields.

CALIFORNIA.

AMADOR COUNTY.

W. T. Beatty has bonded the Alpine mine at Plymouth. The Alpine adjoins the Empire mine, has two shafts, one 700 feet, the other 600 feet in depth. The 600-foot shaft will probably be the first one opened up.

The new 10-stamp mill at the Defender mine, Pioneer district, started on October 15. The Ledger says after a short run it was found that the mortar blocks, made of cement, gave way, and the mill had to be shut down. The cause of the blocks crumbling was improper mixing of material.

The Kennedy new hoist is delayed, material not having arrived.

CALAVERAS COUNTY.

At Hodson the Royal mine is a good low-grade proposition, and with its 40-stamp mill has proved profitable. Out of 365 days, the 40-stamp mill was running 362. Graders are at work for a new 120-stamp mill to be erected soon. A rock breaker of sufficient capacity to supply the 240 stamps will form a part of the new works. Fifty men are employed on the grading. Each battery of ten stamps will be operated by a separate motor. It is expected that when the new mill is in operation the cost of mining and milling the ore from the mine will be reduced below 80 cents a ton.

The Wilbur-Womble Co., adjoining, is putting up large works.

EL DORADO COUNTY.

J. H. Batcher of Sacramento is vice-president Twin Brothers' M. Co. The mine is situated near Salmon Falls. A contract has been let to run a 350-foot tunnel; a 15-stamp mill is to be put in.

At the Zimmerman gravel mine the compressors afford power to work eight drills. Twenty-three men are at work at the mine grading roads and sites.

INYO COUNTY.

Ballarat says: "There is nothing about the story of a niter excitement here, nor are there any teams with prospectors on their way to the niter beds in Death valley."

J. S. Stotler has bought from H. E. Finley of Ballarat a half interest for \$5000 in a gold and lead claim in Rising Springs mining district, in the Funeral range of mountains. The new purchaser will put men to work taking out ore.

KERN COUNTY.

The Randsburg Miner says Hough, Balchweid & Boydston are working the Pearl Wedge, are down 140 feet, and have a ledge of ore 18 inches in width which shows \$75 per ton.

The cleanup at the Red Dog mill from 80.75 tons of ore from the Butte mine resulted in three bars worth \$5824, average \$72 a ton. A check for \$4607 was also paid to the Butte Co. by the same milling company as a result of the treatment of 680 tons of tailings, recently cyanided, representing a gross total production of the Butte mine for October of \$10,431. The increase in production of the ten months of 1902 over the corresponding ten months of 1901 is \$14,636.52. Sinking another shaft of 100 feet was resumed. This will make the depth of that shaft 525 feet.

The price of oil at Bakersfield is 18 cents per barrel.

A new deposit of fuller's earth has been discovered in San Emidio mining district, 35 miles from Bakersfield.

LOS ANGELES COUNTY.

The merger of the Edison Electric Co., Redlands Electric Light & Power Co., Pasadena Electric Light & Power Co., Santa Ana Gas & Electric Co. and other

subsidiary companies of the Edison Electric Co. will be known as the Edison Electric Co. Among the projects under way are the construction of a 20,000 H. P. water plant on the Kern river, a 3000 H. P. water plant on Mill creek and a 3000 H. P. steam plant in Los Angeles.

MADERA COUNTY.

The Los Angeles Mining Review learns that at the Alpha mine Superintendent Cummings has sixteen men at work.—J. T. McClellan, superintendent of the Texas Flat group, has graded for a 20-stamp mill. This company has a 3-mile water pipe line.

MARIPOSA COUNTY.

Eighteen mining claim locations in the Coulterville district were recorded in October.

NEVADA COUNTY.

Superintendent H. G. Murray, at Meadow Lake, is developing the property. E. Deacon is foreman of the only mill running in the Meadow Lake mining district and has good returns.

The Sierra Queen M. Co. will sink to the 500 level. The mill at present is not running.

Superintendent W. H. Bray of the Posey mine, owned by the Posey Con. M. Co., has the shaft down 350 feet, and for the past 50 feet ore going \$100 per ton has been taken out. The ledge is 1 foot wide and carries free gold.

A shaft will be sunk on the Gold Blossom.

At the Rose Hill mine, on Winchester hill, tributaries have put a lot of stull dirt from the mine through the Southern mill, realizing \$60 per load on it.

The Pennsylvania Co. has fifty-three men working in the mine.

PLACER COUNTY.

A cleanup of twenty-one tons from Johnson's Last Chance mine at Ophir returned \$23 to the ton.

J. A. Hill, on Rock creek, has made a crushing of a ton of ore that netted him \$1000.

Superintendent J. Waggoner of the Bonnie Bee mine has the tunnel in 400 feet; 2000 tons of ore are on the dump; five stamps will be set up; in the spring another five will be added.

The air compressor for the Mountain Maid mine at Chicago Park is in position. It weighs 15,000 pounds.

SAN DIEGO COUNTY.

F. A. Aces of Los Angeles is appointed receiver of the mine in Rancho Rincon del Diablo in a suit for foreclosure on the mine on the ground that the terms of the contract were not fulfilled. According to the contract the mine was sold to S. M. Green of Milwaukee for \$100,000; \$75,000 was to be paid down, \$5000 was to be paid at the end of four months, and the remaining indebtedness was to be paid in \$5000 installments every two months. Green paid the \$75,000 and the first \$5000, but neglected to pay the balance of \$20,000.

SANTA CLARA COUNTY.

R. B. Harper, superintendent of the Santa Teresa quicksilver mine on the Monterey road, reports an ore bed that justifies the erection of a forty-ton furnace. The strike was made 300 feet from the surface.

SHASTA COUNTY.

In the Balaklala mining case the decision is in favor of the Balaklala M. Co., against Madden, Murray, Conroy and Grotefend. A decree was made last Saturday for the sale of the property and the payment to Murray and Conroy what is due them on the original purchase price of the mine. The case was taken into court on a suit for partition. Murray and Conroy claimed an interest in the property and Grotefend claimed a judgment lien on the mine. The court found that Murray and Conroy have no interest in the property except a balance of \$2700 on account of the purchase price.

Manager W. A. Hall of the Brandy Creek W., L. & P. Co. says he will begin work at once on the \$200,000 enterprise of supplying Redding and Keswick with gravity water from Brandy creek.

The Northern California Electric Power Co. says it will have its poles up and wires stretched into Winthrop this year. There are fifty men working on the line.

The Mountain Copper Co. has the fire in the Iron Mountain mine under control. A 60-inch main, 2 miles in length, has been connected with the mine and the lower workings where the fire was raging is completely flooded.

The Bully Hill reports 7 feet of ore showing forty ounces silver, \$6 gold and 6% copper.

The Searchlight notes that work at the Shasta King mine of the Trinity Copper Co. is being apparently suspended gradually. The air compressor and diamond drills have been closed. The force has been reduced; there are about twenty men now employed by the company,

mostly in the mine. The Shasta King mine is west of Kennet in the Backbone district. It is owned by the company named, at the head of which is T. W. Lawson. A. H. Brown, former superintendent Bully Hill property, is in charge of operations at the Shasta King.

The Redding C. & G. Co. has a year's bond on the Roid mine, \$10,000, and a bond of \$6000 for fourteen months on the La Plant group.

SISKIYOU COUNTY.

Wadsworth & Barton, with placer ground consisting of 665 acres comprising 5 miles of Beaver creek and 4 miles of the Klamath river, propose to dig a 10-mile ditch, capacity 8000 inches of water, to cover these properties. Capital required, \$200,000. In Klamath river placer mines, from an estimate of different mines worked from Virginia bar to Horse creek, by wing damming and the working of the river bars, from a total of 535,176 cubic yards of gravel \$971,158 was realized. This includes all the ground worked in the mines from the surface down.

TRINITY COUNTY.

Superintendent G. Day of the Enterprise will retimer the upper tunnel. This tunnel is in 226 feet. Three shifts will work in the lower tunnel. This drift has been advanced 1100 feet on the lead and opens up a body of high-grade gold ore.

Manley & Woodlin have bonded the Enterprise group of mines, on the east fork of Trinity river, 25 miles from Weaverville. A 10-stamp mill, perpetual water right and all necessary buildings for the operation of the mines are included in the deal. M. Manley says he will be the manager and will double the capacity of the mill plant and increase the force of men now at work. A. L. McLean will assist him in the management of the property. The mill will be in charge of J. F. Stevens.

TUOLUMNE COUNTY.

(Special Correspondence).—At the Spring Gulch mine crosscuts are being run into the hanging wall on the third and fifth levels to the hanging wall vein, which has been proved in the upper workings.—For the projected Yosemite Railroad from Chinese Camp preliminary surveys have been made by J. G. Hopper and a grade established to the level of the Tuolumne river via Woods creek.

Near Columbia the Springfield Tunnel Co. have struck a channel in the north incline at a depth of 350 feet.

In the Leap Year gravel mine, 2 miles west of Jamestown, there is 4 feet of pay gravel in the face of the tunnel.

The Sonora Independent says, at the Mt. Hood or Rawhide Extension G. M. Co. the mill is completed and the machinery is being put in. At the Toledo mine the shaft is sunk 300 feet and still going down. The vein is the full width of the shaft; sulphurets exceedingly high grade; some free gold shows. At the Rawhide timbering generally in the mine goes on. The Clio at Jacksonville has the mill running on full time with oil as fuel.

In the Dutch mine a winze 112 feet from the 1200 to the 1300 is finished. The shaft is down 100 feet below the 1300-foot level. The angle of the shaft is 68. A drift has been run south of the shaft 360 feet. The mill is crushing on full time. This is almost the only mill running in that vicinity, owing to the fact of oil being used for fuel. The new boiler is all set with oil connections and burners; capacity 95 actual H. P. A 2000-foot new steel Roebeling cable 1 inch in diameter has been delivered at the mine.

At the Harvard G. M. Co. No. 1 shaft is timbered to the 700-foot level; sinking will proceed.

The Dreisam at Arastraville will resume shaft sinking.

At the App the mill, machinery and power-water pipe are being overhauled.

The Tuolumne W. & E. P. Co. will resume operations at the Phoenix lake power house November 15. All the big mines in the county will resume operations next week. At the Eagle-Shawmut mine the new 100-stamp mill is in readiness and will be started up next Thursday with water for power. A full force of miners will be put on.

YUBA COUNTY.

Work has begun on debris barrier No. 1 at Daguerre Point, on the Yuba river, below Smartsville.

COLORADO.

BOULDER COUNTY.

Near Eldora, the Tungsten M. & M. Co.'s shaft has been sunk 90 feet. The formation is a peculiar one, two distinct ore bodies lay side by side. On the foot wall and for about 4 feet above is found a body of wolframite, rich in tungstic acid. Above this lies a body of sulphide ore carrying gold, silver and copper. Of the wolframite, the Primos Chemical Co. of Primos, Pa., says in a letter to Manager H. T. Coates: "We have just finished the

analysis of samples sent us and find them to contain 69.98% of tungstic acid. Ores that contain 65% to 72% tungstic acid are classed as high-grade ores. We are in the market for all we can get of this class of ore and will be glad to quote you prices when you are ready to ship."

CHAFFEE COUNTY.

The Magenta mill at Granite has started, treating ore of the Washington mine.

CLEAR CREEK COUNTY.

Near Silver Plume the reopening of the Atlantic-Pacific tunnel, once known as Brick Pomeroy's great bore through the continental divide, is looked for. The tunnel has attained a length of over 1 mile on the Atlantic slope, through the Argentine gold belt, at a depth of 2000 feet under the apex of Kelso mountain.

R. A. Hall, who proposes to construct a railroad through the Idaho Springs mining district from Central City to Yankee, says he has the greater portion of the necessary funds guaranteed and intends to push the project forward.

The sale of the mines on the Gem, which was noted in last week's issue, and consolidation of the different mines on Seaton mountain, with 100 claims, into the Gem Consolidated Mines Co., means the handling of over 1000 tons of crude ore per day at the mills, and a heavy tonnage shipped direct to the smelters.

Manager B. C. Catrena of the Terrible group of mines at Silver Plume will spend \$50,000 in putting in machinery and development work.

The Red Elephant group of seventy claims on Red Elephant mountain at Lawson will have machinery equal to the Terrible.

The Prudential M., T. & T. Co. has elected W. C. Hood manager. The properties owned by the company are on Republican mountain, including nineteen recorded claims and in rights embraced within the Prudential and Montgomery-Ward tunnel sites, each of which controls an area 3000 feet square. The Prudential tunnel will be the main thoroughfare for developing all the territory at depth, and is projected to be driven 6000 feet in length, with laterals extended each side on the veins as they are cut. The first 3000 feet of the Prudential tunnel will intersect nearly all of the nineteen claims.

At Yankee Hill H. Preston is pushing work on the Chesapeake tunnel.—The new shaft on the Mary Murphy is completed.—Constant development work is being done on the Puritan.—The Hilton tunnel is being driven ahead.—B. F. Musgrove talks of a new 10-stamp custom mill.—The Ora Verde Co. has two shifts working with electric drills. There is a 4-foot body of ore.—The battery of the dry process mill may be enlarged.—As says from the Mack No. 2, east slope Yankee hill, show values of \$25.

The Marshall-Russell tunnel at Marshall park has cut the sixth blind lode. The vein was cut at a distance of 460 feet. It carries 8 feet of white quartz, with 3 feet of sulphide ores, averaging \$8. The property is being worked by water power from Clear creek. A steam plant is to be installed. While the trammers are working at the breast the air drills are used in the drifts, and vice versa. The vein cut by the tunnel two months ago has been drifted on for over 100 feet, the pay ore having opened up to a width of 10 feet.

Last Saturday, in the 1000-foot level of the Aliunde mine, workers on the Haggar & Co. lease on the Aliunde knocked down \$1000 worth of ore with two shots.

CUSTER COUNTY.

R. Irwin is working the Reveille mine at a depth of 107 feet, and has ore that runs an ounce in gold, thirty ounces silver, 20% lead. The Bassick mine shaft is down 1700 feet, and is producing ore that runs 60% gold to 40% silver. The company's mill will have to be removed to Westcliffe owing to scarcity of water at the mine where it is now located. When this is done the company will build its own railroad from the mine to Westcliffe, a distance of 10 miles, and the Rio Grande will equip and operate it.

The Reveille mine is three-fourths of a mile from the Bull-Domingo, now being worked by the Neptune Co., which has sunk the shaft 1000 feet, and is taking out concentrating ore which is treated at the mill at Westcliffe. The Bassick is down 1700 feet, ore production running 60% gold, 40% silver. This company has a good mill at the mine; but, owing to the lack of water, will move it to Westcliffe, or construct a new one there. When this is done, the company will build its own railroad from the mine to Westcliffe—a distance of 10 miles—and the D. & R. G. Co. will operate the line for them. It is expected this line will pass the Bull-Domingo and will therefore carry the product of that mine as well.

The construction by the Denver & Rio Grande of a branch from Texas creek on its main line to Westcliffe, a distance of 29 miles—has practically opened up a new

district where an old one once existed. The combination of the gold and silver with the baser metals makes an ore valuable for fluxing and enables the mines in the district to obtain low treatment charges. The altitude of the camp is about the same as that of Cripple Creek; the climate is also similar. The formation is also similar to that in the Cripple Creek district, phonolite, andesite and porphyry being found in contact with the older granite. Fluorine is also found much as in Cripple Creek.

Silver Cliff reports a strike by Haskell & Jackson, who are reported "quarrying out the ore and shipping it by the carload." The ore runs \$44 per ton.

FREMONT COUNTY.

The Work Co. has made a shipment of forty-three tons from the Morning Glory No. 2 of the Dorcas mill at Florence.

GILPIN COUNTY.

At Mountain City the Gregory-Buell is shipping ore.

The October shipments total 405 cars, or 8100 tons, and represent the tonnage of smelting and crude ores, tailings and concentrates shipped to the Denver and Golden smelters, as well as to the Idaho Springs concentrators. For the same period last year the shipments were 350 cars, or 6469 tons, a difference in favor of last month by 55 cars, or 1631 tons, a gain of 25%.

At the East Notaway mine, in Russell and Lake districts, the Town Topics G. M. Co. has forty-five men working on the tribute system. The company will install an electric bell system and is figuring on putting in a larger hoisting plant.

Sinking goes on at the Waltham mine, Russell district. Manager R. H. Hastie says the shaft is down 145 feet and the large crevice still holds out. A daily average of three cars of ore is being shipped over the tramway company lines to the Golden plant for treatment. Lumber is at the mine for a new shaft building; the company is going to install a large gasoline hoisting engine.

The Gregory-Buell property, Central City, has a record as a large producer. In segregated form fourteen different shafts were operated and were all profitable producers. The consolidation promises large results.

LAKE COUNTY.

The Ballard, Penn. President and Big Six, on Breese hill, contain bodies of siliceous ores that run as low as \$12 per ton—too low to ship. In these ore bodies bunches of this low-grade stuff appears, and it takes careful watching to keep the ore up to the required standard when shipping to the smelter. At the Ballard dump it is estimated that there are 25,000 tons that will average \$10. To experiment with this, as well as the low-grade in the mine, they will put in a cyanide plant.

The new mill at the Resurrection property is completed. The plant will treat the low-grade ore by a process never before attempted in the district, whereby it is designed that the great bodies of lead-zinc sulphides will yield three distinct products—a clean zinc, a clean iron carrying gold and silver and a lead concentrate with very little iron and some silver and gold.

The capacity of the Arkansas Valley Smelter will be increased from 3500 to 4000 tons a month; by Jan. 1 it will be handling 28,000 tons of raw materials. The new reverberatories are being fired up as fast as completed; by Jan. 1 twelve of these will have been added to the former capacity. These, with the other improvements made during the past six months, represent an expenditure of over \$200,000. S. Guggenheim says: "We are making these improvements to handle the low-grade ores and to enable us to handle all of the ores here of that kind, especially those which can not be shipped at a profit. We can not treat waste, but the company is bending all its energies to a reduction of the cost of smelting."

LARIMER COUNTY.

The Grant Copper M. Co. at Pearl intend to install machinery and develop their property.

Near Leadville, on the Catalpa Crescent property, Lessee McGreavey is taking out twenty-five tons a day of oxidized iron ore.

The Yak tunnel is being driven at the rate of 5 feet a day toward the Ibox ground. For several years the Ibox Co. has been handling an enormous flow of water which is raised 1000 feet. The tunnel will tap this section at a depth of 1200 to 1300 feet and thus furnish natural drainage to that depth.

At Leadville, S. Guggenheim says that the new zinc smelter now in course of construction will start operation at half its capacity in December, employing 200 men, and will be in full operation by spring. At the Philadelphia smelter, most of which has lately been idle, he stated that it is not to be dismantled or abandoned, but that the suspension is due to ore

trouble, and that the works, after remodeling and enlargement, will employ more men than before. The other two smelters, the Pueblo and the Colorado, are in operation.

OURAY COUNTY.

A decision of interest to mining men is rendered by the Secretary of the Interior in a protest filed by W. F. Mattes against the issuance of a patent for the Meddler lode claim to W. J. Hammond, Jr. Mattes located the Swamp Angel group of lode claims at Red mountain and developed them by a tunnel from the Silverton railroad. Hammond located the Sub-Treasury tunnel; unknown to Mattes he also located the Meddler claim at right angles across a number of the Swamp Angel group. The Meddler was advertised for patent, but Mattes did not learn of it until too late to adverse and filed a protest with the Land Office. Investigation showed that the Sub-Treasury tunnel, in which Hammond claimed to have done the work for the Meddler claim, could only reach the latter by passing through the Corn Cob lode of G. Boss, which in the meantime had been patented, and also through several of the Swamp Angel group, as well as ground that was vacant at the date of the Meddler entry. For this reason he held the entry for cancellation. Hammond appealed; the Secretary confirmed the Commissioner's decision.

PITKIN COUNTY.

Since the Mollie Gibson Co. ceased operations upon the property late in the summer, the adjoining Smuggler Co. has been keeping the mine free from water for its own protection. Several times during the past three months rumors have been started to the effect that the Mollie Gibson Co. had leased its property to the Smuggler Co. It is now stated that this deal has gone through. President Hagerman of the company says the report is correct in substance, although somewhat premature.

SAN JUAN COUNTY.

The new mill of the Silver Ledge mine at Chattanooga will be running next month.

The 900-foot tunnel at the King mine on Sutton mountain is entering the vein which it was projected to cut.

The superintendent of the Henrietta says the seventh level is in 1800 feet, and has drifted the last 300 feet in continuous ore. The same ore body, known as the Henrietta-Lizzie vein, is opened up in levels 1, 2, 3 and 7. It is said that thousands of tons of ore have been blocked out, the milling product running \$7 per ton and the smelting output \$20 per ton.

The Gold Spur Co., in Cunningham gulch, will drive a 200-foot crosscut tunnel.

TELLER COUNTY.

Manager Wright of the Lincoln Co., owning the Lincoln mine near Gillett, reports all debts of that corporation, including a mortgage on the property, wiped out. Work is to be resumed on the mine.

The Portland maintains a daily output of about 250 tons. The average value of the ore is reported a little lower than usual. The bulk of the ore mined is shipped direct to the company mill at Colorado City, running about \$25.

A production of about sixty tons a day is being made from the various shafts on the Hull City placer, owned by the Independence Con. Co.

Taylor & Johnson, leasing on the Pharmacist, have a drift extended on 4 feet of high-grade quartz at the 560-foot level. Assays run \$50. The ore shows rusty gold and sylvanite.

The Findley Co. has sunk its main shaft to a depth of 1300 feet and will continue sinking to the 1400-foot point, where it expects to catch the north extension of the Hull City ore shoot.

The Bonanza King on Gold hill, being worked by G. Bent, has produced \$125,000 worth of ore to the 300-foot level. The greater portion of it was taken out by lessees. Mr. Bent is now working the ground for the third year and is following a small streak of high grade.

Owenby & McFarland are shipping about twenty-five tons daily from their lease on the Emma No. 2 of the Isabella Co.

The Gold Button Co. on Sheep mountain, north of Gillett, is driving a tunnel east from Oil creek, which is now into the mountain about 700 feet, to be continued to the 1000-foot mark this winter.

Sinking is under way in the shaft of the Maid of Orleans. A depth of 500 feet will be reached before any lateral work is attempted.

Superintendent Newell of the Buffalo & Cripple Creek Co. will resume work in the Newell tunnel.

The Cripple Creek sampler, situated on the east slope of Bull hill, is running through from 350 to 400 tons a day. G. Fry is manager.

Stratton's Independence is making an output of an average of 250 tons a day.

Most of the ore comes from the upper levels. The average grade of the ore is lower than it was one year ago. General Manager Cornish has men in the lower levels.

Murphy & Baxter, who have a lease on the old workings of the Isabella, are making a production of about twenty-five tons a day. The ground is being worked by four sets of sub-lessees; all of them are making better than wages.

There are now eleven sets of lessees working on the Anaconda Co.'s ground making steady shipments, ore running from one ounce to five ounces per ton.

The Vindicator Con. Co. is outfitting at the rate of 100 tons a day at present.

Emil Salbach, who has secured a two years' lease on the Friday, situated on Tenderfoot hill, and owned by the White City Co., has started work. The shaft is to be put down an additional 300 feet.

The daily production from the Independence Con. Co., known as the Hull City placer, is sixty tons, all mined by lessees.

In the Cripple Creek district there are in operation five sampling plants, giving employment to 175 men, who average \$3.53 a day.

The largest sampler of the Cripple Creek Ore & Sampling Co. on Bull hill has a capacity of 60,000 tons of ore each month. Considerable of the tonnage of ore produced there each month is first sampled before it goes to the mills and smelters. The sampler in many cases is simply the check. Considerable ore, though, is bought outright by the smelting companies, who in turn sell it to the smelters and mills. The combined sampling capacity of the plants in operation exceeds the output.

The largest force of men employed is in the two plants operated by Taylor & Brunton; that firm has a plant on Battle mountain and another on Bull hill. They employ sixty-five men, who average \$3.50 a day. The Cripple Creek Ore & Sampling Co. employs thirty-five men, average \$3.50 per day. The Eagle sampler, forty men, averages \$3.50 per day. The Rio Grande sampler, thirty-five men, averages \$3.75 a day.

Manager De La Vergne says the Isabella more than paid expenses in September and only lost a small sum in October. He will at once begin to unwater the thirteenth level and go to work there.

On the Gold Coin the Dorothy vein has been opened in the ninth and tenth levels for 525 feet in ore all the way.

Manager Rice of the Stratton Cripple Creek M. & D. Co. has been experimenting with cyanide on the ore of the Ironclad on Ironclad hill. Another mill will be built for these ores.

For some time Altman, the highest incorporated town in the world, has been paving the streets with rock taken from the waste dump of the Pharmacist mine. Some of it looked so well that samples were taken at random and assayed; the returns showed an average value of \$20 per ton in gold. As a result men began hauling away the street surface until stopped by the police. The Pharmacist Co. has ceased giving away the dump and is hauling it to the reduction mills.

The new \$100,000 equipment of the El Paso Con. G. M. Co. is in operation. The new shaft has been put to a depth of 600 feet and made 5½ by 16 in the clear.

The advantages of the leasing system are shown by the reports from the different leases on the properties of the United Mines Co. for October. During the month there was shipped by these lessees 975 tons of ore of a gross bullion value of \$27,000. The net receipts of the company from royalties on a basis of 30% amounted to approximately \$4500. In addition, a large amount of dead development work was executed without cost to the company. Among the properties so operated were the Damon, Trachyte, Hanna Britt, Anna May Wells and Pauper, also the dumps of the Damon and the Wild Horse. The different leases furnished employment for about 100 miners.

The Mary McKinney mine shipped 2597 tons of ore in October, worth approximately \$75,000 gross. The bulk of the rock averaged \$40, the lower grade running about \$20 per ton. The ore came from the third and fifth levels, principally, and is exclusive of the 195 tons shipped by lessees, who pay 25% royalties.

At Cripple Creek the Elkton mine superintendent says he is waiting for some definite action to be taken by the mine owners in reference to a drainage tunnel.

At Victor the Economic and Arequa mills and the cyanide plant on Ironclad mountain had a pay roll of \$8849.70 in October. The first mentioned concern employs sixty-five men, who receive \$3.61 a day. The remaining fourteen men are employed by the two other mills. The Economic mill handles the product of the Gold Coin, the Wild Horse, Deadwood, New Zealand, Damon and other properties owned and controlled by them, the product of the War Eagle and other indepen-

dent mines, and is running almost full capacity. The Arequa mill is handling ore averaging not more than \$8 a ton. The Ironclad cyanide plant is handling a grade of ore running about \$5 a ton, and is treating the dumps of oxidized ores that abound on that hill.

IDAHO.

BLAINE COUNTY.

C. C. Ruthrauff has an option upon a ten-claim group of claims adjoining the Minnie Moore group on the southwest. S. Friend will superintend development work.

IDAHO COUNTY.

Though Thunder mountain has ceased to be a name to conjure with, prospectors through the season have done work enough to warrant attention being directed to the district, which will doubtless be heard from next season.

J. B. Hastings, former manager War Eagle at Rossland, B. C., in the Valley View mines, between Ketchum and Thunder mountain, has a property on which he is putting a 20-stamp cyanide mill. Tests show values of \$13.50 a ton. The cost of mining and milling is estimated at \$4 a ton.

KOOTENAI COUNTY.

G. R. Gordon, representing the Cœur d'Alene Dredging Co., has bonded large holdings of placer ground near Tyson; a good dredger will be built.

The Tyson Con. M. & M. Co. has been organized; F. W. Haverland, manager, and C. Toppings, superintendent. This company owns some quartz claims; the War Eagle, the most promising claim. The Tyson Co. will put in a sawmill, and as soon as material can be had will erect a 30-stamp mill.

The Richmond G. M. & M. Co. expect to arrange to mine a large quantity of ore and have it ready for treatment when the mill is started.

LEMHI COUNTY.

Near Salmon City, on the Kirtley creek placers, a large dredger will be constructed by Wright & Dore. The Kirtley creek placers comprise 1000 acres dredging ground.

Near Junction, the Ross Co. during the summer extended its area; it now holds in one group six mining properties. The concentrating plant demonstrated that their ores carried values of 53% lead, 32 ounces in silver and \$3 in gold per ton. Four carloads have been shipped from their central location. M. Savier, superintendent, will sink and tunnel. It is the purpose to buy a traction engine to ply between their workings and the Union Pacific Railroad at Dubois.

SHOSHONE COUNTY.

The monthly output of the Frisco mine, which is preparing to resume operations, has been placed by the trust at 2000 tons. The mill has a capacity of 650 tons every twenty-four hours. It is estimated that the monthly payroll of the mine running under full force will be about \$30,000.

The St. Joe Basin Placer M. Co. has bought eight claims at the headwaters of the north fork of the St. Joe river for \$95,150—cash \$2000, remainder in installments. W. T. Hales of Wallace is manager of the company. The eight claims are the Mutual, Contention, Keystone, Idaho, Climax, Solace, Snowstorm and Sunshine; located twelve years ago, considerable development work has been done; hed-rock, however, has not been reached; in the spring work will be resumed with fifty men and a sawmill built. The property will be worked by giants. Before the property can be converted into a paying one it will be necessary to drain it by changing the course of the creek, which will require capital. The machinery and other supplies will have to be taken in by way of Iron Mountain, Mont., 25 miles from the diggings.

Regarding resumption of work at the Frisco mine, 4 miles from Wallace, Manager Ehrenberg says they shall probably work 275 men.

S. Ellis, from Pierce City, says about 300 men are at work in the various mining properties. The Wild Rose Co. has not been running its mill since early summer, and during the past five months has been doing extensive development work. The shaft has been sunk deeper, the first lot of ore ever taken from the mine is now on the dump, and a working tunnel is now being run. The company is expecting to start the mill on November 6 for the winter run. He has been running the Santiago mine and mill since last June; average value for milling purposes \$15 a ton. He has fifteen men, but the Santiago mill is a water-power plant and will have to be shut down when the winter comes. The Mascot Co. is working 35 men and a 9-stamp mill on rich ore. The Ozark Co. also has men employed and is producing profitably.

The French creek placers have been worked this season by an Eastern company, which has put in a new gold-working

machine; is run by water power. The earth is elevated on a traveling belt and then run over a quicksilver-coated plate by a series of traveling rollers, that agitate it so that earth, gravel and gold comes in contact with the charged plates. The output of these placers has been large this summer, and it is understood that the mining company will run the plant through the winter.

MICHIGAN.

HOUGHTON COUNTY.

The October output of the Atlantic and Wolverine mines broke previous records. The Atlantic product amounted to 310 tons 1520 pounds. The Wolverine output amounted to 512 tons 600 pounds.

MONTANA.

CASCADE COUNTY.

At Neihart, Wright & Henry are working the old Florence mine, and propose to sink 500 feet.

DEER LODGE COUNTY.

The Anaconda Co. is putting in a new system of drainage, by which all the large mines, including the St. Lawrence, Never Sweat, High Ore, Green Mountain, Diamond, Bell, Modoc and Wake-up-Jim are to be drained of their water through the shaft of the High Ore, which has reached a depth of 2300 feet. Seven large pumps are at work in the High Ore; there is a 90-foot pump for the reception of the water from the other properties. A cross-cut is being driven from the 2200 level of the High Ore to connect with the lower workings of the St. Lawrence, Anaconda and Never Sweat, and, as soon as completed, the water of these three mines will flow into the pump of the High Ore and be forced to the 300-foot level by the large pumps in use there.

In the works of the Amalgamated Copper Co., beginning Nov. 1, surface men work nine hours, instead of ten hours, per day.

MADISON COUNTY.

Basin reports that the Mayflower mine, owned by W. A. Clark, has been abandoned. The development work reached a depth of 1250 feet, and at that level the ore pinched out. The ore was in the nature of a chimney and was one of the greatest deposits of gold ore ever discovered there.

The Hennepin Ore Co., incorporated under the laws of Minnesota as the Norrils M. Co., has changed its name. G. M. Gillette, A. C. Paul, G. W. Bestard and J. B. Briggs of Minneapolis are the incorporators; the latter is the Montana agent.

C. H. Hand has charge of the Watseka mine, near Rochester. A 125-ton concentrating mill is to be added. A shoot of base ore at the 500-foot level will require handling through an ore-dressing plant.

MISSOULA COUNTY.

The Cœur d'Alene mining district, in the western portion of the county, reports a vein of copper ore struck on the Richmond claim of the Bitter Root Copper M. Co., about 5 miles from Saltese. Samples assay 25% copper, \$6 to \$7 in gold and a few ounces in silver. The district in which the claims are located is a continuation of the Cœur d'Alene district of Idaho. Superintendent Cooney has charge of the work at the Richmond and Monitor claims. Work goes on and he contemplates putting in machinery next spring. Elliott Bros. will run a 300-foot tunnel on the Chickamin mine on Lolo creek.

J. A. Nelson has bought the Ward Placer Mining Co.'s property on Hughes creek. Jos. Kastner of Helena will have charge of the camp and the work at the mines. He has had experience in hydraulic mining in Alder gulch and Alaska. A new 6-foot flume is being built. A ditch 4 miles in length will be constructed and the water, when the improvements are completed, will be sufficient to furnish a 300-foot pressure for two hydraulic giants which will be put in. The price paid for the property is \$100,000. A cleanup at the head of the flume amounted to \$3200, the result of a two weeks run. It is expected that about \$4000 will be taken out at the lower end of the flume. The total of the season's work will amount to about \$14,000.

PARK COUNTY.

J. M. McNulty, manager Milwaukee M. Co., at Contact, has let a contract to drive 500 feet of tunnel to open up the lower workings of the mine.

RAVALLI COUNTY.

Hamilton reports plans have been completed for improvements to the plant of the Wood Placer M. Co., on Hughes creek. The flume is to be torn out and another and larger structure substituted. The hydraulic pressure is to be furnished by a long pipe line.

SILVER BOW COUNTY.

Butte reports that the Butte & Boston Co. have stopped work on its properties on the east side. Other mines in the same

district have also been closed, among them the Sinbad and Pacific. About \$200,000 was spent on the Sinbad in an effort to find the veins that are supposed to strike in that direction from the Minnie Healey and other mines. F. Farrell is still working on his mines in that district. The other mines of the Butte & Boston Co. are being worked and the company is making some money. Last year its reported net earnings were \$166,136.

NEVADA.

CHURCHILL COUNTY.

D. J. Noyes is at Lovelock from New York and says the American Nickel Co. will resume work on its property at Cottonwood at once. He estimates there is 16,000 tons of nickel ore in the company's mines.

ESMERALDA COUNTY.

Eighteen men are working in the lower tunnel of one of the Blair group of mines at Silver Peak.

In San Francisco, after nineteen years of legal delay, has been tested ownership of a group of mines in the Candelaria district, suit being instituted in the name of the Southern Nevada M. Co. against the Northern Belle M. Co., in which Alvinza Hayward is the principal owner. The defendants were accused also of extracting ore from the plaintiff's property. Damages in the sum of \$48,000 were awarded the plaintiff as well as title to the property involved.

The old Wilson gold property at Pine Groves is bought by Cutting & Hudgens, stated price \$75,000; a payment of \$30,000 was made. The new owners have organized the Pine Grove G. M. Co. and propose to work the property above the water level, to tap the ledge at a vertical depth of 500 feet by running a tunnel 1800 feet, and, as the ledge lies flat, they will have 1000 feet of stope.

EUREKA COUNTY.

Ore shipments by rail from Eureka district for the week ending November 7 were: Eureka Con. 32,900 pounds, Excelsior 160,710 pounds.

LINCOLN COUNTY.

The DeLamar bullion product last month was \$26,956.

The Nevada Keystone M. Co. at Sandy on the 300-foot level has an ore body measuring 6 feet in width and assaying \$200 per ton. The 200-foot level is completed to the 100-foot stope, showing 4½ feet in width of ore assaying \$184 per ton. The mine has been developed to a depth of 450 feet. The mill and cyanide plant, 7 miles from the mine, are running night and day and bullion is being shipped monthly.

In the McGee mines, Silver King district, northwest of Pioche, ore is exposed in the various workings along three different ledges, assaying 20 ounces silver, 20% lead and \$1 gold per ton. Close at hand is pinon pine and cedar, which can be laid down at the mines for \$4.50 per cord.

NYE COUNTY.

Water is flowing in Tonopah. A shipment of ten tons of coal has been received in Tonopah from a deposit 35 miles northeast of that place.

The Honnapah M. & S. Co., S. Newhouse president, will work properties 18 miles east of Tonopah.

STOREY COUNTY.

C. Butters will make Virginia City the headquarters of the Butters Co. and will work the old dumps in that section.

WASHOE COUNTY.

There are forty men employed by the Pacific Con. M. Co. at their Pyramid Lake property.

A strike is reported in the Desert King mine, near Reno, of a ledge 7 feet wide.

The Desert King and Wedekind mines employ eighty men.

WHITE PINE COUNTY.

W. T. Hook, manager New York & Nevada Co., Ely, is closing up a deal for the waters of Murray creek, near Ely, for \$35,000.

NEW MEXICO.

SOCORRO COUNTY.

The cyanide plant recently installed by the Last Chance Co. at Mogollon is reported to be a success; 1200 tons of ore are being treated monthly.

GRANT COUNTY.

Near Lordsburg, Supt. B. W. Randall of the American Con. Copper Co. expects to put in a mill and treating plant.

S. L. Bean of El Paso, who owns the Metropolis and Hidalgo properties, has shipped there a concentrate test of 100 tons and will erect a reduction plant on their property.

The Lena mine is being unwatered. Supt. Hempsted says he will resume sinking.

OREGON.

BAKER COUNTY.

Sylvante has been discovered in the

Greenhorn district. Supt. Lohmyre of the Maxwell mine says should the ore body increase the mill will be put in operation in the spring.

Supt. Neel says the capacity of the new Sumpter smelter will be 200 tons.

The Advance M. Co. has in its 180-foot tunnel on the Storm King claim ore 2 feet wide. Assays give \$62 per ton in gold.

Brown & English are in Quartzburg district to erect a reduction plant.

Work on the Lucky Boy group of claims will shortly begin.

A recent shipment of twenty-five tons of ore was from the Chloride mine in the Greenhorn, averaging \$100 to the ton.

GRANT COUNTY.

The Pomeroy dredger, to mine the placer bottom of the North Fork of the John Day and Canyon creeks, has been in operation two months on the North Fork below John Day City. It will not run this winter. Twelve cords of wood a day are required to run it.

MALHEUR COUNTY.

Machinery is being received at the Black Eagle mine—a 20-stamp mill, drills and engine. This property is located on a porphyry dike, carrying low-grade ores.

JACKSON COUNTY.

In Wolf creek district ditches are being enlarged, new flumes built and preparation made for the operation of the hydraulic mines this winter. Scriber & Henderson have in a new arrastra that will break eighteen tons of rock a day. The Wolf Creek M. & D. Co. has men at work on their quartz and placer properties.

JOSEPHINE COUNTY.

Supt. Ryan is developing the Harth quartz property, near Woodville. A tunnel will tap the vein at a depth of 200 feet.

The Sowell copper mines of Althouse district have closed down temporarily. Six tons of smelted copper matte are shipped to San Francisco.

The new group of copper mines at Althouse, in the Grey Back mountain, located last year by Babcock & Kitterman, are under development.

T. W. Draper, manager Waldo S. & M. Co. at Waldo, says his company will put in a 100-ton smelter at Takilma, a new town that has sprung up near the mines and on the line of the proposed Oregon & Pacific railroad.

SOUTH DAKOTA.

CLARK COUNTY.

At Garden City the Penobscot M. Co.'s stamp crushing cyanide mill is ready to be connected.

The Arcade M. Co. shaft expects to reach quartzite in 100 feet more. P. O'Dwyer of Central City is manager.

CUSTER COUNTY.

Cleveland, Ohio, men have organized the Central Black Hills Co., which is opening up a body of copper carbonate ore about 15 miles northwest of Custer City. A plant of 100 tons daily capacity is being built to treat the ore. A leaching process will be used to extract the copper, the tailings will be subjected to the cyanide process to recover the gold values. The mine is opened up by tunnels and open cuts disclosing bodies of ore, situated so that it can be mined very cheaply, it being on a high mountain with a perpendicular face. The ore can be quarried and handled by gravity to the mill.

The Central Black Hills Copper Co. is opening up a body of copper carbonate ore about 15 miles northwest of Custer City. A plant of 100 tons daily capacity is being built to treat the ore. A leaching process will be used to extract the copper, and the tailings will be subjected to the cyanide process to recover the gold values. The mine is opened up by numerous tunnels and open cuts. It is so situated that it can be mined cheaply, it being on a big mountain, with a perpendicular face. The ore will be quarried and handled by gravity to the mill. The mining will be done by steam drills.

LAWRENCE COUNTY.

The Homestake is daily producing 3000 tons gold-bearing ore; 960 stamps are dropping continuously. The ores last year averaged \$3.65 gold per ton; about 3000 persons are employed in their extraction and treatment.

At Lead the Globe M. Co. has two carloads of machinery for the shaft in Nevada gulch. The company is beginning deep exploration work and the shaft recently started is designed to go down from 500 to 1000 feet before crosscutting to open the vein.

The property of the newly organized Potsdam G. M. Co. is 9 miles west of Deadwood, in the Ida-Gray mining district (Ragged Top), on the west of the Spearfish canyon, adjoining on the north the territory of the Gold Hill M. Co., and on the east the properties of both the Deadwood-Standard G. M. & M. Co. and the Spearfish G. M. & R. Co., and covers 570

acres, including among its groups of claims the Puritan, the Dorn and the Lee. The Lardner lode, and the Puritan, Dorn and Lee groups are patented; the remaining ground is being surveyed for patent. The ore is a soft minersillized limo gangue.

The Spearfish Co. operates a 250-ton cyanide plant, and its monthly cleanups average about \$30,000. This mill, built on the site of the mill which burned a year ago, was put into operation last spring; in September the mill was paid for; in October the company declared a regular monthly dividend.

The Gold Hill M. Co. is sinking for quartzite in Johnson gulch, at a present depth of 300 feet.

The Deadwood-Standard G. M. & M. Co. is opening up a new ore body and is taking out ore from seven points on the south foot of Ragged Top mountain. A trestle connects the present workings with the upper story of the mill. The process employed is the dry crushing; the crushing is to 1/4 inch mesh. The extraction is from 80% to 90%. The mill is operated by one ten-hour shift, handling 3000 tons per month, filling one tank per day. Thirty-five men are employed. S. B. Morrison is superintending the mill, E. Hanschka has charge of the mining.

PENNINGTON COUNTY.

The Columbus M. Co. will order a steam hoist and other machinery for its property near Rochford. Ore has been found. It is free milling and concentrating, worth \$40 a ton.

The Golden West M. Co., which recently purchased the Benedict, Yellow Bird and associated claims in Hornblende camp, 5 miles from Rochford, is developing the properties. There is a Chilean mill on the Benedict, which was operated before the new company was organized and which is soon to be started again.

The Gregory M. Co. is continuing the lateral workings from the bottom of the Montana shaft, near Nahant. The ore is largely pyritic and is regarded as an excellent concentrating or smelting proposition.

At Keystone the Mount Atna G. M. Co. has completed the new hoist at the shaft on the Lucky Boy.

C. J. Sine is experimenting on the ores of the Tycoon G. M. Co. with cyanide.

UTAH.

BEAVER COUNTY.

At Frisco, Superintendent Johnson of the Cactus reports a strike 400 feet west of the former one in the upraises from the second, third and fourth levels of chalcopryrite in a solid mass.

BOX ELDER COUNTY.

The Liberty Bell M. Co. has incorporated. The company has nine claims—the Silver King lodes; H. Cohn, E. M. Friedman, A. W. Mountney, W. W. Pitt.

JUAB COUNTY.

The Centennial Eureka at Tintic has a body of ore which averages 52 ounces silver, 5% copper and \$6 gold per ton. Superintendent Brown on the level above has drifted 130 feet on the channel, which has been crosscut for 46 feet with but one wall exposed. He has 3000 tons of ore to be delivered. He is adding to the bins between the railway tracks—for the gold and silver ore, the heavy copper ore and the medium copper ore with gold and silver. About 100 miners are employed on the property.

SALT LAKE COUNTY.

The management of the Highland Boy smelter forwarded 300,000 pounds of copper bullion, carrying silver and gold, to an Eastern refinery last week.

At Alta, H. Wallace, manager Grizzly and Lavinia, has copper ore in the Grizzly and is shipping ore carrying silver, lead and gold from the Lavinia. At the Columbus, Superintendent Jacobson has good ore. Superintendent Rooklidge has silver, lead and gold ore at the Oxford. On the City Rocks and Morrill & Sowles groups work is progressing. A long tunnel is being run by Manager Hatfield of the Albion—now in 760 feet.

The consolidation is announced of the York and Copperfield group of eleven patented claims and the transfer to the Utah Apex M. Co. W. C. Orem, manager, has blocked out 6000 tons of milling ore; in the tunnel workings of the York ore running 40% lead and from eight to ten ounces silver per ton has been mined.

SUMMIT COUNTY.

Superintendent Mixer of the Creole, at Park City, in the rehabilitation of the old workings, has exposed ore in several places.

WASHINGTON.

FERRY COUNTY.

The Tom Thumb mine at Republic will not resume operations until the Washington & Great Northern line is completed into Grand Forks.

OKANOGAN COUNTY.

R. Insinger of the American Flag M.

Co., on the Methow, has closed the 20-stamp mill after making a run of 500 tons of sample ore from the mine. It is the intention to put in a cyanide plant in the spring.

PIERCE COUNTY.

Engineers at Tacoma propose to work a project to utilize the headwaters of the Puyallup river from the glacier on Mount Rainier. It is claimed that if successful this will be the first instance where glacial waters have been used directly to provide power. The plan is to construct from the glacier a flume 14 miles long through which a head of water will flow sufficient to generate 50,000 H. P. The water in running through the flume will drop 600 feet, and through penstocks will be diverted into turbines connected with electric generators. A three-phase alternating current is to be transmitted at high voltage to Tacoma and Seattle.

STEVENS COUNTY.

The Easter Sunday mine, on the Colville reservation, west of Bossburg, is installing a 16-drill compressor and a 90 H. P. hoist. It is also putting in a 50-ton mill. The mine is a gold-copper property.

WYOMING.

CARBON COUNTY.

The What Cheer Copper M. Co. is developing property on Dunkard creek, Encampment district. One tunnel in 337 feet has opened up a number of streaks showing bornite and carbonate of copper. In a shaft 200 feet up the hill from the tunnel are kidneys of copper glance and quartz carrying copper assaying 9%.

FOREIGN.

BRITISH COLUMBIA.

A company has been formed in Revelstoke to operate the Beatrice, at the head of Mohawk creek.

A group of claims, headwaters North Fork of Kettle river, are bonded for \$60,000 to J. Moran of New Denver, 10% in sixty days, 20% in four months, the balance in six months. It is a galena proposition and has assayed 590 ounces in silver and 15% copper to the ton. The group is reached by way of Arrow lake and Fire valley.

Regarding zinc in the Sandon ores and a demand for that metal in the United States, in response to an inquiry the acting Secretary of the U. S. Treasury says as to whether raw zinc ores are dutiable when imported for smelting and consumption, that there is no specific provision in the present tariff act, and there has been no decision of the Board of U. S. General Appraisers or the courts as to the classification of crude zinc ores, and that question is one which is primarily determined by the collector of customs, but in all probability the ores would be held dutiable at 1 cent per pound.

The recent vote of the Fernie miners on the continuance of the hours of work compromise at eight and one-half underground, stood: For eight and one-half hours underground, 33; for eight hours underground, 129; cast no vote, 108. The result is not satisfactory to either side. The miners claim that they are now entitled to the old system, but the management maintains that those not voting show by their indifference that they are perfectly satisfied with the present.

W. J. Robinson is in San Francisco from Atlin with \$5000 in gold. His company owns 1000 acres, and he has come out to contract for a gold dredger similar to those so successfully operated on the Feather river at Oroville in California. During this season almost 100 men have been at work at Atlin and they have cleaned up \$2,000,000. He says the miners at Atlin have cleaned up 25% more gold to the man than the miners have on the Klondike. Work at \$6 a day could have been given to more miners had they been there to operate claims.

The recently boomed gold-producing black sands at Wreck Bay, Vancouver island, seem to have become exhausted, after making good yields during two seasons.

At the Highland mine, Ainsworth, L. Cortiana says the concentrator is at work. There are forty-five men employed on the property; good ore is being taken out.

The Granby mines use thirty tons of powder a month, and the Le Roi twenty tons a month. The tariff on powder is 3 cents a pound, which for these two mines totals \$30,000 per annum for duty alone. The same applies to fuse, candles, steel, etc.

At Sandon an offer of \$11 per ton, made by the C. P. R. last week, is accepted by the mine owners, who are getting ready to ship their zinc to Missouri.

The Bosun at New Denver is preparing to ship 250 tons to the Lanyon smelter, which heretofore went to Antwerp, in Belgium, and will increase its force to seventy men.

Boundary mines last week produced

12,000 tons. The Granby mines shipped 5072 tons to the smelter; Mother Lode, 4256 tons; Sunset mine, 630 tons; B. C. mine, 990 tons; Snow Shoe mine, 720 tons; Emma mine, 350 tons; total for the year to date, 409,773 tons.

Rossland reports that the profits of the Le Roi Co. in October were over \$85,000.

The report of the directors of the Hall M. & S. Co., Ltd., of British Columbia, for the year ended June 30, 1902, states that in consequence of the exhaustion of the ore reserves, and the necessity therefore for writing off the amount of £19,571, charged to development account at June 30, 1901, and also writing off £1094 from the value of the mine supplies, there is a loss on the mining account of £6980; on the other hand, the smelting account shows a profit of £5071. After taking credit for sundry receipts, £1735, and providing for the general expenses, including debenture interest and the balance of preliminary expenses not dealt with last year (together £5772), there is a loss of £5945, which, together with £6673 written off for depreciation, must be added to the amount brought forward from last year—viz., £6980—making a total debit balance to be carried forward of £19,599. It was not until the spring of the year that the permanence of the ore body at the lower levels became doubtful. Before deciding to abandon operations, the board subsequently had the mine examined by the best expert available, whose views entirely coincided with those of the other two. The board has leased the mine to M. S. Davys, former superintendent.

FRANCE.

The striking coal miners show great dissatisfaction at the arbitration decision against a raise in the rate of wages and their national committee has called a meeting at Arras. At St. Etienne the miners have adopted resolutions to appeal to the dock laborers to renew the strike against loading coal unless the companies grant the miners' terms.

MEXICO.

DURANGO.

The Mexican Central has signed a contract with the Governors of the States of Durango and Zacatecas for the immediate building of a line from Gutierrez, on its main line, to the city of Durango, a distance of about 120 miles. The construction of the road will begin as soon as the Legislatures of the two States approve the contract.

SONORA.

Cananea reports that the production of bullion during the month of October is 5,000,000 pounds ahead of any previous month in the history of the company's operations. The management expects to do better this month.

La Mexicana mine, operated by F. Morgan, has resumed. This company is now composed of New York men. The management is still retained by Mr. Morgan. T. Johnson, of El Paso, Texas, says the United States M. & S. Co. has been incorporated in New York to operate the Ahogado gold and silver mine, on the Sonora river, 30 miles above Hermosillo. The mine was formerly known as the San Jose de Gracia.

J. S. Williams, Jr., assistant superintendent Montezuma M. Co., at Nacosari, in regard to the properties there which belong to the Phelps-Dodge people or the Bisbee Co., says they have a concentrating plant capable of reducing 200 tons daily and have a railroad 5 miles long from the mines to the concentrators and smelters. A tunnel 5000 feet long cuts the ore about 700 feet below the upper tunnel. The ore body, with both tunnels cut across it, is over 5000 feet wide, and the ore continues up the mountain from the upper tunnel a distance of 700 feet. The ore is very base and is first concentrated and then the concentrates smelted and the matte then run into the converters. The ore carries a fair percentage, and, with the completion of the railroad from Cos to Nacosari, will materially increase the profit, as a gr at saving will be made in the hauling of coke, etc.

TAMAULIPAS.

The Mexican Petroleum Co., A. P. Maginnis, manager, operating at Ebano, has three oil wells which will yield on an average 100 barrels per day.

NEW ZEALAND.

The Minister of Mines reports the total number of dredgers in the west coast and southern districts: Working, 183; building, 59; standing, 33; undergoing removal, 19; total, 224. It is estimated that this branch of mining finds direct employment for 2000 persons, apart from the men employed in building dredgers and machinery and in repairs.

There are thirty cyanide plants in New Zealand, three using charcoal, the others zinc shavings.

PERU.

Minister I. B. Dudley at Lima, in a report to the State Department on the copper industry of Peru, and American participation therein, says owing to the fall in the price of copper, the entire industry has undergone "a certain paralysis," but it is expected that the energy and ability of Americans (who have established some of the largest plants in Peru) will contribute to the highest prosperity of the copper industry. The introduction of American methods of exploitation and of American machinery already have reduced the cost of production to "an incredibly low figure," and the building of new railroads have enabled even the native miners to find a new and wider sphere for the industry.

PORTO RICO.

A. R. Gibson of Silver City, N. M., has received from Porto Rico twenty ounces of coarse placer gold which assays 20 cents fine. W. M. H. Woodward of Silver City leaves for San Juan, taking an outfit for assaying, and will do development work.

SOUTH AMERICA.

CHILE.

The long legal contest between the Santiago and Liverpool nitrate companies has been decided by the Chilean courts in favor of the Santiago Co.

THE KLONDIKE.

In the volume of business which the United States consulates of the world handle, Liverpool, London and Paris only rank ahead of Dawson. Berlin is fifth. The total valuation of traffic in connection with the American government over which the United States Consul has had supervision the present open season on the Yukon is \$11,000,000. This represents chiefly gold shipped from Dawson to the United States, commodities shipped from Dawson under consular invoice to lower Yukon points and the supervision of the payment of wages to steamer men who signed on American vessels on the Alaskan side and were paid here.

Personal.

W. C. GREEN has returned to Cananea from the East.
J. H. BROWNLEE of Atlin, B. C., is in Seattle, Wash.
C. D. HEBBARD has returned to Siskiyou county, Cal.
F. R. CULBERTSON of Washington will winter in California.
S. D. NICHOLSON is manager Auric M. Co., Lake City, Colo.
J. SEWARD is manager Mohave G. M. Co., Leland, Arizona.
ROBT. JONES is manager Pike's Peak Power Co., Victor, Colo.
L. W. CRANE is superintendent at Uncle Sam mine, Gilbert, Ariz.
GEO. W. KIMBLE has returned from San Francisco to Oroville, Cal.
W. F. SNODGRASS is now manager Kelvin Copper Co., Florence, Ariz.
J. L. RUSSELL is manager Witch's Head M. Co., Montezuma, Colo.
J. P. GRAVES has been re-elected manager Granby, B. C., Con. M. Co.
P. TRAIN is superintendent Golden West M. Co., Rochford, South Dakota.
L. H. CARVER has returned to San Francisco from Grass Valley, Cal.
H. S. MOREY has returned from Georgetown to Placerville, Cal.
H. A. TITCOMB has returned to Denver, Colo., from Lake county, Colo.
T. C. MEYER is superintendent Hotchkiss M. & Red. Co., Lake City, Colo.
ROBT. BELL, of Blackfoot, has been elected State Mine Inspector of Idaho.
J. PHILLIPS has resigned as millman at the Mt. Jefferson mill, Groveland, Cal.
G. M. McDOWELL is manager Con. Copper Mines of Idaho, Mineral, Idaho.
H. L. TEAGARDEN has returned to Boulder, Colorado, from Reno, Nevada.
D. P. JONES is general manager Steamboat mine, Alleghany, Sierra county, Cal.
CHAS. LERCHEN succeeds G. Branham as manager Georgetown, Cal., G. M. Co.
G. E. VOORHEES JR. has charge of the Las Vegas copper mines, Coyame, Mexico.

W. J. GOLPIE has been appointed gold commissioner for Ymir, B. C., vice J. A. Turner.

W. HUTCHINSON has resigned the foremanship of the Tomboy M. Co., Telluride, Colo.

J. C. H. FERGUSON, San Francisco representative Midvale Steel Co., goes East November 30.

J. DRENNAN at Sisson, Cal., is superintending development of the Rainbow

group of mines for the Mount Shasta G. M. Co.

F. V. PATTEN succeeds W. M. White in the management of the smelter at Beaver, Utah.

W. L. SHAFFER is now superintendent Pittsburg Con. M. & T. Co., Idaho Springs, Colo.

GENERAL SUPERINTENDENT HARRISON of the Mount Shasta M. Co. is now at Winthrop, Cal.

T. H. TRACY has been appointed manager of sales of the Mine & Smelter Supply Co., Denver, Colo.

E. JUESSEN of Spokane, Wash., has established a branch office at Sumpter, Or., in charge of R. H. Clark.

R. H. CAMPBELL, who has extensive mining interests near Barkerville, B. C., is sojourning in San Francisco.

F. BRADLEY has been appointed superintendent Sierra Railway, Jamestown, Cal., vice W. C. Potts, resigned.

A. D. GASSAWAY, superintendent Union Blue Gravel mine, has returned from San Francisco to North Bloomfield, Cal.

W. P. DUNHAM, general manager Independence Con., Cripple Creek, has returned to Colorado from California.

SUPERINTENDENT KEATING of the Bully Hill mine has returned to Redding, Cal., from southern California.

J. E. SPURR, U. S. G. S., is in Tonopah, Nevada, to oversee the work of making a geological survey of the district.

C. L. RATCLIFF has returned to San Pedro, N. M., from an examination of the New Comstock mines, Kingman, Ariz.

E. B. HACK is in Denver, Colo., from the Camp Bird mill, Ouray, Colo., making changes and alterations in the cyanide mill.

A. C. BEATTY has returned to Denver, Colo., from Butte, Mont., where he had been examining the Heinze copper properties.

D. T. KISSELL, former superintendent Anchor mill, Park City, Utah, is now acting in a similar capacity at the Sheba mine, Mill City, Nev.

W. NICHOLLS, former foreman of the Morning mill, has returned to the Cœur d'Alenes as superintendent Empire State mill, Wardner, Idaho.

GEO. KINGDON, formerly of Hanover, N. M., is now at Bacoachi, Sonora, Mexico, where he has charge of some mines for Phelps, Dodge & Co.

H. SALMON, superintendent of stamp mills L. S. J. Hunt's gold mines, Corea, has returned after a four years' absence. He will spend the winter in Michigan, returning to Corea next spring.

H. K. WHEELER is engaged in engineering work for the Gold Road Mining & Extraction Co., Mohave county, Arizona, who are building reduction plants in that section. Mr. Wheeler will return to Los Angeles, Cal., about the 20th inst.

A. G. WILKES, formerly with the San Pedro G. & C. Co., Santa Fe, N. M., has gone to Agua Calientes, Mexico, as foreman for the American Smelting & Refining Co. The works of the San Pedro G. & C. Co. were closed down November 1 and all the employees discharged.

Obituary.

JNO. M. BUFFINGTON, former superintendent Wyoming mine, died at Nevada City, Cal., on the 3rd inst., aged 53.

Book Notices.

"A Manual of Drawing," by C. E. Coolidge, assistant professor of machine design, Sibley College, Cornell University; 8vo, ninety-two pages, ten full-page plates, paper, \$1. John Wiley & Sons, New York.

"The Design of Simple Roof Trusses in Wood and Steel, with an Introduction to the Elements of Graphic Statics," by Malvered A. Howe, C. E., professor of civil engineering, Rose Polytechnic Institute; member of American Society of Civil Engineers; 8vo, X+129 pages, sixty-seven figures, three folding plates, seventeen tables, cloth, \$2. John Wiley & Sons, New York.

Catalogues Received.

"It never wears out" is the taking title of the Elaterite Roofing Co.'s catalogue, an illustrated description of this "mineral rubber," with showing of what it is and the value of its use; issued by the Elaterite Roofing Co., 713 Market street, San Francisco.

A descriptive catalogue of assayers' and chemists' cupel machines, hydrocarbon burners, blowpipe outfits and furnaces, handily arranged and full of the practical

illustrated information most likely to be wanted by prospective purchasers, is received from the firm of F. W. Braun & Co., 501-505 N. Main street, Los Angeles, Cal.

A clever little manualette comes from the S. H. Supply Co., Twenty-second and Larimer streets, Denver, Colo., showing the growth of the company's business and modestly maintaining that it was just plain ordinary hustling that made it grow. Incidentally is noted that the company handled 118 carloads of machinery from Cripple Creek in three months.

Commercial Paragraphs.

THE Mine & Smelter Supply Co. of Denver, Colo., have an order for eleven Wilfley concentrating tables from the Anaconda Copper M. Co., Anaconda, Mont.

MASURITE, the new explosive company, is establishing a magazine in the vicinity of San Francisco. G. W. Myers, the Pacific coast agent, says the number of orders and inquiries in regard to masurite exceeds expectations. He expects a large consignment of masurite in the immediate future.

THE Burt Mfg. Co. of Akron, Ohio, have just closed a contract for four large Cross oil filters of special style for use on four new battleships now being built for the Government. In this connection they call attention to the fact that their filters have now been adopted by ten different governments.

CHAS. C. MOORE & Co., 32 First St., San Francisco, Cal., have accepted the agency of the Holthoff Machinery Co. of Cudahy, Wis., on the Pacific coast. They state that this company's machinery is now being installed in a great many of the new mines on the coast and in New Mexico and Arizona. Chas. C. Moore & Co. say they are now ready to accept any proposition to install complete mining and smelting plants of any size and that they will do their best to keep up the good name they have already established on the Pacific coast.

THE J. H. Montgomery Machinery Co., Denver, Colo., report sale of one 2-horse steel whim, knocked down for mule-hack transportation, for Krakauer, Zork & Moye, Chihuahua, Mexico; steel pipe line for carrying water up into a flume, working against 120-foot head, for the Highland Valley Power Co., Highland Dam, Idaho; pressed steel ore hockets for Ketelsen & Degetau, Chihuahua, Mexico; six ore cars for Arps Bros. Hardware Co., Ouray, Colo.; hoisting plant for C. C. Bourne, Carrizozo, N. M.; steam drilling outfit for Kaylor Bros., Grand Encampment, Wyo.; four No. 6 ore buckets for Shless & Co., Torreon, Mexico.

New Patents.

DEWEY, STRONG & Co.'s SCIENTIFIC PRESS PATENT AGENCY, 330 Market St., S. F., has official reports of the following U. S. patents issued to Pacific coast inventors:

FOR THE WEEK ENDING NOVEMBER 4, 1902.

712,474.—GAS GENERATOR—D. Barnard, Bakersfield, Cal.
712,486.—FURNACE—C. S. Batbelder, Spokane, Wash.
712,558.—CORN PARER—E. Dellwig, S. N. Jose, Cal.
712,559.—MOTOR CONNECTIONS—Donnat & Greenmeyer, Los Angeles, Cal.
712,561.—CHUTE GATE—H. L. Dunn, Seneca, Cal.
712,568.—CAN BODY FORMER—J. Eldridge, S. F.
712,577.—BABY CARRIAGE SEAT—M. Elwert, Lodi, Cal.
712,736.—DOLL—W. G. Flint, San Jose, Cal.
712,967.—ANIMAL EXTERMINATOR—J. V. Goulardt, Hayward, Cal.
712,530.—CURRYCOMB—J. Herfert, Tucker, Wash. S. F.
712,795.—CALCULATING MACHINE—A. Hoch, Alameda, Cal.
712,650.—SUBSOIL PLOW—T. J. Hubbell, Pasadena, Cal.
712,935.—SOLDERING IRON—A. G. Kaufman, S. F.
712,941.—TACKLING—M. Lamond, Oakland, Cal.
712,699.—HAT FASTENER—Leu & Sjostrom, Los Angeles, Cal.
712,686.—BRIGUETTE MACHINE—R. Martin, S. F.
712,938.—BICYCLE—J. W. Master, San Diego, Cal.
712,938.—ROTARY SCRAPER—R. H. McCaughey, Campbell, Cal.
712,576.—DENTAL TOOL—J. F. O. McMath, Oakland, Cal.
712,953.—TOE CLIP—F. J. & W. H. McMonies, Portland, Or.
712,701.—DENTAL TOOL—A. F. Merriman Jr., Oakland, Cal.
712,944.—SHIP LOADING DEVICE—W. F. Mills, S. F.
712,959.—HOISTING BOOK—C. F. Pohlman, Spokane, Wash.
712,592.—ROCK DRILL—J. Puecbagut, Black Diamond, Wash.
712,721.—V. PORIZER—N. L. Rigby, Los Angeles, Cal.
712,722.—GAME TABLE—E. R. Robbins, Sacramento, Cal.
712,723.—CLOCK—H. Schumacher, S. F.
712,734.—BORING DRILL—A. C. Shuster, Bakersfield, Cal.
712,612.—BALLOT MARKER—T. C. Spelling, S. F.
712,940.—DENTAL BRIDGE WORK—E. L. Townsend, Los Angeles, Cal.
712,941.—DENTAL TOOL—E. L. Townsend, Los Angeles, Cal.
712,933.—HAMMER—G. F. Volbt, S. F.
712,938.—GAS STOVE—T. R. Warren, Glendale, Cal.
712,939.—ADDRESS HOLDER—D. E. Werts, Grants Pass, Or.
712,879.—OIL BURNER—D. C. Wilgus, S. F.

Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

BOTTLE LOCK.—No. 712,444. Oct. 28, 1902. W. E. Swett, San Francisco, Cal. This invention is designed to securely lock bottles after they have been filled to prevent tampering with the contents. It consists in forming the bottle with a frangible chambered lug cast upon one side, having a spring-pressed bolt located in the chamber, and in the formation of a stopper with a corresponding chamber or slot into which the bolt is forced when the stopper is in place, whereby the removal of the stopper can only be accomplished by breaking the frangible lug to release the bolt.

STRAP CONNECTION FOR GARMENTS OR THE LIKE.—No. 712,353. Oct. 28, 1902. M. Dattlebaum, Oakland, Cal. The object of this invention is to make connections for straps such as are used on trousers, vests and wearing apparel, and is also applicable for making connections wherever buckles are used. It consists of a plate having a plurality of studs projecting from its face and adapted to pass through openings or holes made in the parts to be connected, these studs having heads or slots in the end and the ends of the straps to be connected are formed with suitable bores, so that one of the studs may be inserted into one strap and the other into the one with which it is to be connected, and any adjustment is thus easily made.

COMBINED STOP AND RELEASE MECHANISM FOR PLOWS.—No. 712,371. Oct. 28, 1902. V. T. Gilchrist, Benicia, Cal. Assigned to Baker & Hamilton of San Francisco, Cal., a corporation of California. This invention relates particularly to means for supporting and regulating the movement of the rear bearing or caster wheel of wheeled plows. Its object is to provide a simple stop and release mechanism for the axle of said wheel, whereby the latter may be held against lateral movement outwardly or may be left free to swing in either direction. The invention consists of a vertically adjustable bearing block for the rear axle, an angular lever plate pivoted on the frame and having a stop engaging said axle, a foot lever pivoted intermediate of its ends, and connections between said lever and said lever plate whereby the latter is thrown in and out of engagement with the axle, as desired.

GEOGRAPHICAL CLOCKS.—No. 712,729. Nov. 4, 1902. H. Schumacher, San Francisco, Cal. This invention relates to a device for instantly determining the time upon any meridian in the world and the relative time of different meridians. It consists in the combination in a timepiece of a fixed annular dial with time subdivisions marked thereon, a central disk independent thereof having a polar map and meridians of the northern hemisphere radiating from the center to the periphery, with time indicating hands turnable about the common center whereby the meridians other than that which coincides with the hour hand will indicate correct time at those points, and points or rays of substantially triangular shape projecting radially from the periphery of said disk and coinciding with the meridians of places in the southern hemisphere whereby the relative time of all places in both hemispheres is simultaneously indicated.

HYDROCARBON BURNER.—No. 712,879. Nov. 4, 1902. D. C. Wilgus, San Francisco, Cal. This invention relates to that type of hydrocarbon burner wherein oil and steam or air are conducted independently to the casing of the burner and are thence discharged within the combustion chamber of the furnace. It consists in combination in a hydrocarbon furnace of separate oil and steam feed pipes, controlling valves in said pipes, valve stems having diametral notches on their ends by which they may be engaged and turned independently, link and lever connections between said stems whereby they may be operated in unison, a bladed draft regulator and connections therebetween and said valve connections whereby the draft may be operated simultaneously with said valves.

MARINE PROPULSION.—No. 712,677. Nov. 4, 1902. R. B. Hewson, San Francisco, Cal. This invention consists in the novel construction of propellers having a variable pitch and mechanism by which the blades may be reversed and the combination therewith of a high speed engine, such as the steam turbine, the mechanism being of such a character that the pitch of the propellers may be varied or the position of the blades reversed without reversing the engine or driving mechanism or decreasing its speed of rotation.

GAME TABLE.—No. 712,722. Nov. 4, 1902. E. R. Robbins, Sacramento, Cal. Assigned to J. E. Lynn and B. J. Lynn of same place. This game consists essentially of a long narrow level table solidly supported upon suitable legs having surrounding rails or cushions. Centrally arranged with relation to said cushions is a narrow raised track or path with depressed channels upon either side, the whole being covered with billiard or suitable cloth. At one end of the centrally raised track are positions for miniature tin pins. In intermediate between the ends is a spot upon which the object ball is placed, and near the opposite end of the track is a line or position within which a cue-ball is placed. By a stroke of the cue this ball is impelled against the spot ball, and the latter, if accurately struck, will be driven along the track and against the pins. The game is a combination of billiards and ten pins.

DEVICE FOR LOADING VESSELS.—No. 712,948. Nov. 4, 1902. W. F. Mills, San Francisco, Cal., one-half assigned to J. H. Bennett, San Francisco, Cal. The object of this invention is to combine in a single working apparatus an endless traveling carrier, one end of which is movable and adjustably located upon the wharf from which the load is to be taken and the other is turnable and adjustably connected with the chute upon which the load is to be received and by which it is directed to the point of deposit upon the vessel, and in conjunction therewith of a means carried by the apparatus to provide the necessary power for driving the belts, with adjustments therefor.

CHUTES AND DISCHARGE GATES.—No. 712,661. Nov. 4, 1902. H. L. Dunn, Seneca, Cal. This invention comprises a novel arrangement of a plurality of coating gates, whereby the flow of material, such as sand, gravel, crushed rock and the like, may be arrested or controlled. It consists of a closed chute having an extended flange on the sides, a gate flexibly connected to form a continuation of said bottom, or to be turned up transversely thereto, a second gate adapted to close the mouth of the chute and having arms or connections pivoted to the sides of the chute and about which pivots said arms are turnable to open or close the gate.

MINING AND SCIENTIFIC PRESS

Whole No. 2209.—VOLUME LXXXV.
Number 21.

SAN FRANCISCO, CAL., SATURDAY, NOVEMBER 22, 1902.

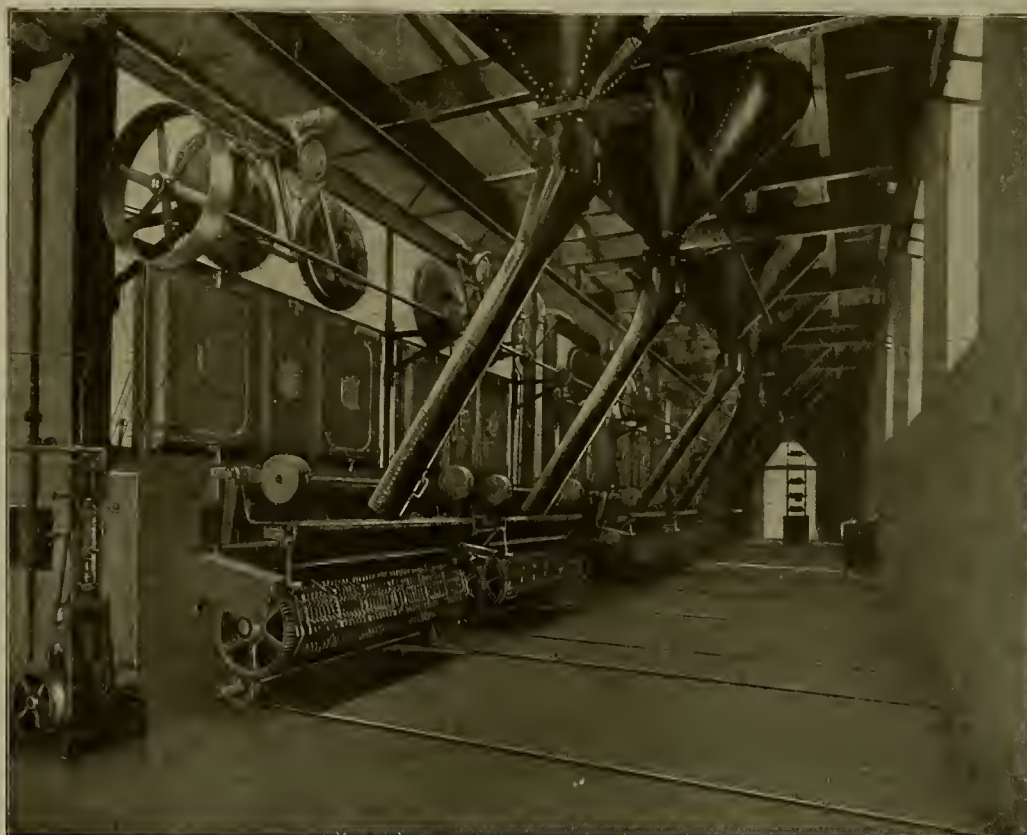
THREE DOLLARS PER ANNUM.
Single Copies, Ten Cents.

Progressive Combustion.

Some years ago engineers conceived the idea that economical combustion of coal could only be obtained by progressively advancing the coal in the furnace so that each component of the coal would be completely consumed on reaching that portion of the furnace which was adapted and designed for its proper combustion. Working on this idea with hand-fired furnaces, they placed the fresh fuel just inside the furnace door, where the volatile gases were released and the coal was coked. The coke was then pushed back to finish its combustion and form an incandescent fire, over which passed the volatile gases from the fresh coal, to be repeated when fresh fuel was fired. Despite the fact that much of the benefit derived from this method of firing was neutralized by the inrush of cold air through furnace doors necessarily opened for firing and cleaning—a loss inevitable when hand-fired furnaces are used; nevertheless, it was demonstrated that perfect application of the principle of progressive combustion would result in the complete utilization of all the heat units in the coal without any losses due to partial combustion. Since this discovery, engineers have endeavored to improve furnace settings and methods of firing coal, in order that the conditions for progressive combustion might be produced.

Since hand firing can not furnish a uniform and constant supply of fuel with requisite air, nor maintain a uniform furnace temperature, the endeavors to secure a progressive combustion have evolved a variety of stokers. Some are planned to feed the coal continuously upon inclined grate bars, over which the coal is designed to travel by gravitation or agitation.

Another form of stoker is built to force the fuel up into the furnace through a narrow trough, along the upper edges of which air under pressure is blown into the fire which piles over the trough and concentrates a blowpipe effect upon portions of the boiler and setting; but this is not deemed entirely satisfactory in the case of bituminous coals. A type of automatic stoker, originating in England, furnished the basis of another device for obtaining progressive combustion. It embodied a moving endless chain mounted on a frame, with provision for the continuous and uniform feeding of coal into the furnace, both fuel and grate traveling together. The operations of feeding the coal into the furnace, carrying it through the progressive stages of combustion, removing the ashes and clinkers, and maintaining a clean grate surface and free supply of air, were to a



Green Traveling Link Grate.

certain extent automatically performed. Being largely independent of the quality of fuel, this stoker successfully used the poorest and cheapest coals. In its original form this chain grate stoker had its limitations. The cast iron frame was brought so close to the surface of the fire as to be quickly warped or cracked by the heat. Short links were closely strung upon round rods, but difficult to remove when a link was to be replaced, and unavoidably reduced the air spaces, and so prevented the proper supply of air to the furnace. In its original construction, the length of the chain grate upon which the fuel burned was too short for complete combustion, there was inadequate protection against leakage at the bridge wall, and the regulating gate was imperfectly protected against the furnace heat. An igniting arch across the furnace seems necessary in this type as a heat

deflector to ignite the coal as it passes from under the grate, and the only form then known was a curved arch, which, to be effective, had to be built with the least possible crown, resulting, except in very narrow furnaces, in weak, unstable construction, and unable to withstand hard service without frequent and expensive renewals. These defects limited chain grates in size and capacity and proper ratio of grate surface to heating surface could not be obtained. The Green Engineering Co. of Chicago have a traveling link grate, illustrated herewith, in which the side girders of the frame are entirely removed from the furnace fire and increased uniform air supply thus provided. Thin staggered links of great depth and long overhang shear any clinker which may lodge against the bridge wall, while at the same time they completely clear the ash from all the air spaces of the chain at every turn around the rear and front sprockets. The illustration shows one of these automatic stoking devices in operation.



Iron Ore on the McCloud River, California. (See page 294.)

IN Del Norte, Cal., mining notes this week, on page 299, is an account of ocean sands at Gold Bluff and the wash and swirl that make gold saving partially profitable at times. The same thing on a much larger scale exists at Nome, Alaska, where from the sea are swept great quantities of gold sands, locally assumed to be originally resultant from the glaciers comparatively near that have slowly cut their way to the sea. Taking the rein off the scientific side, and giving play to the imagination, what a gigantic quartz crusher this glacier makes as it grinds down the gold quartz, a huge machine beside which the biggest crusher devised by humans is but a toy; a herculean machine that tears off the tops of the mountains, grinds them to powder, carries the "pulp" a hundred miles with no regard to size of sluice plates, and makes the ocean itself a huge accessory to sift and toss it on the shore.

MINING AND SCIENTIFIC PRESS.

ESTABLISHED 1860.

Published Every Saturday at 330 Market St., San Francisco, Cal.

TELEPHONE, DAVIS 771.

ANNUAL SUBSCRIPTION:

United States, Mexico and Canada..... \$3 00
 All Other Countries in the Postal Union..... 5 00

Entered at the San Francisco Postoffice as second-class mail matter.

Chicago Office (Telephone, Harrison 73).....787 Monadnock Block.
 Denver Office (Telephone, Olive 733).....606 Mack Block.

J. F. HALLORAN.....Publisher.

San Francisco, November 22, 1902.

TABLE OF CONTENTS.

ILLUSTRATIONS.—Green Traveling Link Grate; Iron Ore on the McCloud River, Cal., 290. The G. E. Hose Couplings, 298. Mining and Metallurgical Patents, 298.
 EDITORIAL.—Of Great Practical Value, 291.
 MINING SUMMARY.—299-300-301-302.
 LATEST MARKET REPORTS.—17.
 MISCELLANEOUS.—Progressive Combustion, 290. Concentrates, 292. California Miners' Association, 293. Steam Plant for Gold Mines; Undeveloped Iron Deposits, 294. Some Practical Mine Pointers, 295. Expenditure on Unpatented Claims; Imperial Cyanide Method; A Modern Gold Mill; The G. E. Hose Couplings, 296. A Butte Miners' Opinion; Improved Cathode Plate; The Mineral Crest, or the Hydrostatic Level Attained by the Ore-Depositing Solutions in Certain Mining Districts of the Great Salt Lake Basin, 297. Mining and Metallurgical Patents; A Georgia Stamp Mill, 298. Personal; Commercial Paragraphs; Catalogues Received; New Patents; Copper Statistics; Notices of Recent Patents, 303.

Of Great Practical Value.

In last week's issue was given the suggestive titles of 100 topics of practical interest to mining men, each of which might be made the base of a valuable article thereon. Along the same lines it might be further suggested that in these columns is weekly found just that kind of articles written by practical men, and of great value to progressive workers in every department of mining.

It may be in order to cite some original articles which have recently appeared in this paper:

"Notes on Ore Dressing," by A. W. Warwick of Prescott, Arizona; "Construction of an Upraise," by F. Sletcher of California; "Quicksilver Recovery from Greasy Refuse," by D. B. Huntley of Idaho; "The Switzerland of Colorado," by T. A. Rickard of Colorado; "Bookkeeping for Mines," by S. I. Hallett of Colorado; "On the Concentration of Ores by the Use of Water," by Chas. Taylor of Arizona; "Dredging for Gold," by Theo. F. Van Wagenen of Idaho; "Gold Mining and Milling," by H. V. Croll of Montana; "Outcrops and Croppings," by J. P. Wallace of Oregon; "Treating Refractory Ore," by S. E. Bretherton of New Mexico; "Deadly Gas in Mines," by A. T. Heydon of California; "Cyaniding at El Dorado Canyon," by A. E. Vandercook of Nevada; "Iron Mines of Southern California," by C. H. Hubbs of California; "Masonry Dams and Retaining Walls," by G. T. Pardoe of Sussex, England; "A Door Closed to Miners," by A. H. Ricketts of California; "The California Copper Co.," by F. F. Sharpless of Massachusetts; "Wet Crushing and Cyaniding Siliceous Ores of the Black Hills," by Jno. M. Henton of South Dakota; "Testing Gold Dredging Ground," by R. M. Downie of Pennsylvania; "The California Oil Industry," by E. H. Rydall of California; "The Divining Rod," by David Kirkwood of British Columbia; "Successful Precipitations from Solutions Weak in Cyanide," by Matt W. Alderson of Montana; "Cheap Mining and Milling at the Spanish Mine," by H. F. Brown of Illinois; "Two Curious Lakes of Nevada," by W. H. Fairbanks of California; "Copper Mining at Placeritas de Nacosari, Sonora, Mexico," by H. B. Layton of Arizona; "Sinking vs. Tunnelling in Development Work," by J. M. Johnson of Washington; "Antimony in Austin, Nevada," by W. C. Gayhart of Nevada; "Use of the 'Baby' Air Drill," by H. P. Stow of California; "Mount Whitney, Cal., Electrical Transmission," by H. G. Parsons of California; "Amalgamation of Metals, Normal and Electrolytic," by J. H. Jory of California; "Southern Oregon Placer Conditions," by Theo. F. Van Wagenen of Idaho; "Some Observations on the Practice of the Cyanide Process at Mercur, Utah," by Wm. Magenau of Utah; "Cyanide Plant at Weaver, Ariz.," by D. E. Bigelow of Arizona; "Small Mine Concentration," by S. I. Hallett of Colorado; "How to Make a Clinometer," by A. S. Cooper of California; "The Atlin Gold Fields," by J. H. Brownlee of British Columbia; "The Joplin Zinc District of Southwestern Missouri," by J. H. Steele of Colorado;

"The 300-Stamp Mill on Douglas Island," by Henry Watson of Alaska; "Outlines of Structural Geology," by J. A. Edman of California; "Matte Smelting Plant at Campo Seco," by Edw. J. Fowler of California; "Gold Dredging at Oroville, Cal.," by H. G. Parsons of California; "Ozokerite," by Dr. J. Ohly of Colorado; "Terlingua Quicksilver Mining District," by H. W. Turner of the U. S. G. S.; "Empire Mines, Past and Present," by Geo. W. Starr of California; "Stamp Mill Practice at Octave, Ariz.," by D. E. Bigelow of California; "Uranium and Its Ores," by Dr. J. Ohly of Colorado; "Oldest Gold Mining Camp," by T. Van Wagenen, now of South Africa; "Mine Blasting," by L. J. Safley of Arizona; "Mill Practice in Cyaniding Siliceous Ores of the Black Hills," by John M. Henton of South Dakota; "Keeping and Indexing Notes," by E. A. H. Tays of Mexico; "California Crude Petroleum as a Fuel," by E. H. Denicke of California; "Estimation of Copper in Ores by Cyanide Process," by O. H. Packer of California; "Republic, Wash., Sampling and Reduction Works," by D. C. Jackling of Colorado; "Catching Black Sand," by John D. King of New Mexico; "Boise Mining District," by Robt. Nye of Idaho; "Copper Deposits of Southwestern Nevada," by E. McCormick of Nevada; "Machine Mine Rock Drills on the Pacific Coast," by A. E. Chodzko of California; "Characteristics of California Petroleum," by A. S. Cooper of California; "Oil Fields of Kern County, Cal.," by H. G. Parsons of California; "Successful Working of Cement Gravels," by G. E. Bailey of California; "Cross Shaft, Angels, Cal.," by S. A. Hoffman of California; "Protecting Shaft Timbers When Blasting," by J. P. Munger of California; "The German Meniecke," by S. I. Hallett of Colorado; "Use of Hot Blast in Smelting," by S. E. Bretherton of Colorado; "West Australia Mining Laws," by Geo. Hope of California; "A California Gold Dredger," by R. H. Postlethwaite of California; "Suggestions on Inland Gold Dredging," by P. R. Eteson of California; "New Methods for the Extraction of Copper and Zinc," by Dr. J. Ohly of Colorado; "Orthodox and Wildcat Oil Propositions," by A. S. Cooper of California; "Ralston Divide, Placer County, Cal.," by A. Bordeaux of California; "Gravel in Snake River Gravel Bars," by W. H. Washburn of Oregon; "Treatment of Flat Hoisting Cables," by A. E. Johnson of Montana; "High Pressure Rotary Pumps," by Jno. Richards of California; "Leaching of Copper Ores," by Dr. J. Ohly of Colorado; "Mines of Esmeralda County, Nev.," by H. W. Turner of U. S. G. S.; "Stamp Mill Foundations," by A. W. Warwick of Colorado; "Power Required by Stamps," by the same author; "Mining in Korea," by W. G. Anderson Jr. of California; "Petroleum Oil Pipe Lines," by A. S. Cooper of California; "Manufacture of Uranium Compounds," by Dr. J. Ohly of Colorado; "Wet Process Copper Extraction," by W. A. Scott of Arizona; "Oil Engines in Mining and Milling," by A. W. Warwick of Colorado; "Permanganate Process," by N. Norman of California; "Power Required by Stamps," by H. Louis, Newcastle, England; "Notes on Tepic, Mexico," by Clarence King of California; "Granite Bi-Metallic Mill," by A. D. Moffat of Montana; "Calculating Compressed Air Pressure," by D. E. Bigelow of California; "The Bequerel Ray," by Edw. Booth of California; "Tamping in Blasting," by R. H. Bemis of Montana; "Dorcas Pneumatic Cyanide Mill," by E. F. Gropello of Colorado; "Tonopah," by S. A. Knapp of Nevada; "Use of Tamping in Blasting," by C. L. Lang of California; "Elements in Design of Roll Crushing Plants," by Jesse Scobey of Colorado; "Rare Minerals in Gold Quartz Veins of Eastern Oregon," by Waldemar Lindgren of the U. S. G. S.; "Home for Prospectors," by N. E. Linsley of Washington; "Forest Endowment of Pacific Slope," by J. G. Lemmon of California; "Leadville Pumping Practice," by A. W. Warwick of Colorado; "Cyaniding Complex Gold Ores," by F. H. Probert of California; "Electrolytic Precipitation From Cyanide Solutions," by J. H. Jory of California; "Genesis of Ore Deposits," by M. W. Alderson of Montana; "Smelting Siliceous Lead-Copper Carbonates," by A. Hauman of Mexico; "Sulphide Ore Problem," by J. W. Worsey, St. Helens, England; "Method of Saving Fine Gold of Snake river," by Wm. H. Washburn of Idaho; "Automatic Sampler, Aspen, Colo.," by S. I. Hallett of Colorado; "Cooling Water

by Compressed Air," by A. E. Chodzko of California; "Loss of Pressure by Friction of Water in Pipes," by D. E. Bigelow of California; "Comparison of Fire with Water for Concentration," by S. E. Bretherton of Colorado; "Vein Structure," by W. H. Weed of Montana; "Sampling Mill Work," by Jesse Scobey of Colorado; "Laboratory Amalgamating Device," by H. S. Guess of Canada; "Purchase of Mining Machinery," by F. F. Snyder of Illinois; "Genesis of Ore Deposits," by E. A. H. Tays of Mexico; "Portland Cement Manufacture on the Pacific Coast," by A. H. Cederberg of Washington; "Late Gold Dredging Practice," by R. L. Montagu of California; "Wet Crushing Cyanide Mill in the Black Hills," by E. Sawyer of South Dakota; "Placers of Cariboo, B. C.," by R. H. Campbell of British Columbia; "Modern Method of Finding New Elements," by Edw. Booth of California; "Standard Assay Certificate Form," by R. L. Dunn of California; "Water Conduit for Power Plant," by L. Waggoner of California; "Mine Electric Bell System," by E. M. Kirk of Colorado; "New Method of Quicksilver Extraction," by J. H. Jory of California; "Small Things in Mining," by W. H. Storms of California; "The Mind of the Engineer," by C. H. Fitch of Illinois; "Solving the Fuel Problem in Arizona Mines," by J. H. Wood of Arizona; "Cyaniding Silver-Bearing Tailings," by J. F. Terry of South Dakota; "Corundum in Montana," by J. A. Edman of California; "Benton Mills Dam," by C. C. Derby of California; "Gases in a Quicksilver Mine," by P. Rearden of Wyoming; "Meadow Lake Mining District," by C. W. Raymond of California; "Treatment of Refractory Silver and Gold Ores at the Mill," by R. C. Campbell-Johnson of British Columbia; "Driving Tunnels by Hand," by J. H. Schockley of Colorado; "Thunder Mountain," by Robt. Bell of Idaho; "Edges of Drill Bits," by C. Shachman of Arizona; "Workings of a Manager's Mind," by C. H. Fitch of Illinois; "A New Mexican Mining District," by E. B. Van Osdel of Washington; "Realizing on Concentrates When Shipping is Impracticable," by E. A. H. Tays of Mexico; "Testing Cyanide Solutions by Silver Nitrate," by B. W. Begeer of Colorado; "Tests of Cast Iron Pipe," by R. K. Crokey of Lorraine; "Stateline Mining District," by G. H. Smith of Utah; "Screen vs. Hydraulic Sizing," by S. I. Hallett of Colorado; "The Nome Gold Fields," by O. Halla of Alaska; "Silver-Lead Mines of Darwin," by A. B. Chittenden of California; "Ultimate Velocity of Gases," by H. D. Dibble of Utah; "Use of Petroleum for Power Purposes," by W. Forstner of California; "Electric and Compressed Air Mining Locomotives," by F. C. Perkins of New York; "Mining as a Profession," by J. B. Balcomb of California; "Henry Train Lighting System," by C. F. Elliott of Ohio; "Smelting Arsenical Ores in Blast Furnaces," by Herbert Lang of California; "Placer Mining Kinks," by C. P. Richardson of Idaho; "Stave and Binder Flume," by Guy Sterling of Utah; "Water Purification for Domestic Use," by F. Rigaud of California; "Assaying Low-Grade Silver Ores," by C. M. Fassett of Washington; "Experiments with Concentration," by W. H. Washburn of Idaho; "Leaching Sulphide Copper Ores," by J. A. Fleming of Arizona; "Power Required to Deposit Copper by Electricity," by T. K. Wilkinson of Colorado; "Compressed Air for Mining from Electric Power," by J. B. Tregloan of California; "Bullion Retorting and Melting Furnace," by E. L. Ballou of California; "Small Smelting Works," by Herbert Lang of California; "Stamp Battery Block Foundation in Soft Ground," by W. H. Washburn of Idaho; "Crude Oil for Tempering Rock Drills," by B. Hastings of Arizona; "Acid Plant at Black Warrior," by E. H. Benson of Arizona; "Concentrative Experiments on Antimonial Silver Ores," by C. M. Fassett of Washington; "Made Ground," by C. H. Fitch of Illinois; "American Copper Mines," by H. J. Bond of New Jersey; "Drift Mines of El Dorado County," by G. W. Kimble of California; "New Form of Cupel," by Jos. Voyle of Oregon; "Reformed Copper Ores," by J. C. Goodwin of Arizona; "Hints to Prospectors," by W. J. Adams of California; "Smelting Charges," by C. P. Crawford of New Mexico; "Oxidizing Agents in Cyanide Mill Solutions," by J. F. Terry of Mexico; "Evolution of the Stamp Mill," by Irving M. Scott of California; "Shaft Sinking," by C. K. Colvin of Colorado; "Silver King Concentrating Mill," by J. H. Steele of Utah; "Details of Cyaniding," by E. Gayford o

North Carolina; "Mineral Wealth of China," by F. R. Wardle of California; "Finer Issues of Mining," by C. H. Fitch of Illinois; "Width of Sluice Plates," by W. J. Adams of California; "Smelting on Vancouver Island," by W. M. Brewer of British Columbia.

The man who reads the above list understandingly will see that those articles cover nearly everything in mining and metallurgy. The man who had an up-to-date treatise on those subjects would think he had a good library on such matters. The list and the names of the authors are merely indicative of the scope of the paper that presents such an amount of information to its readers, this being but one of the features that make this paper so popular among mining men everywhere.

And it is to be noted that there is in this list not one that is merely an abstract theory or an academic notion. Those articles were all written by men who daily do the things they talk about, and who wrote from the abundance of their experience. It is that which makes such articles of great practical value.

Concentrates.

GOOD DYNAMITE will not have moisture more than 1%.

THE highest mountain in United States territory is Mt. McKinley, Alaska, 20,460 feet.

MINERS' CANDLES cost \$5 per box in Spokane, Wash., and \$6.25 per box in Sandoz, B. C.

SODIUM CHLORIDE and copper sulphate are used in chloridizing silver sulphurets or sulphides in the pan.

DETERMINATION of the specific gravity of any solid or liquid should be made at a temperature of 60° F., or 15.5° C.

THE highest point ever reached by a railroad is Galera tunnel, on the Oroya railroad, Peru, S. A.—15,665 feet above the sea.

ON any unpatented mining claim, located since Jan. 1, 1901, regardless of how much work was done on it in 1901, there must be \$100 worth of work or improvements in 1902 to hold it.

A TANK 5 feet 6 inches square would hold 226.28 U. S. gallons for every foot in depth. A round tank 5 feet 6 inches in diameter would hold 177.72 U. S. gallons for every foot of depth.

CHLORATE OF POTASH is explosive by itself. If a bead of chlorate be suddenly heated to a high temperature by passing an electric current through a loop of platinum wire in which the bead is held an explosion will result.

IN ordinary temperatures and conditions, amalgam from a hydraulic sluice would run about 35% gold and 65% quicksilver; of such amalgam, when retorted, 100 pounds might yield about 58 pounds quicksilver—a loss of about 10%.

THERE are two kinds or classes of mining experts—buyers' experts and sellers' experts. This in addition to or on the side, unaffected the ordinary expert who is not for the buyer or the seller. The buyers' expert is a bear, the sellers' expert a bull. It is not the ordinary trend of a man's nature that places him in either position, but strictly business reasons.

ABANDONMENT and forfeiture of an unpatented mining claim are two very different things. One can abandon a mining claim voluntarily, but he can forfeit it only by failure to comply with required legal provisions for holding it. Forfeiture is easier proved than abandonment. Any public mineral land which has been forfeited or abandoned can be re-entered by the same or another locator.

IN the electric recovery of pure tin from waste tin cuttings the tin is recovered by electrolysis, and the clean iron either sold as scrap or converted into green coppers, which may be further converted into red oxide and Nordhausen sulphuric acid. The electrolyte in the stripping tanks is a 1½% solution of commercial hydrochloric acid, to which is added a small quantity of oil of vitrol.

TELLURIDE ORES of Kalgoorlie, West Australia, are of a somewhat different nature to those at Cripple Creek, Colo. They are of very much less specific gravity and are found somewhat in conjunction with hornblende and conglomerate schistose formations. Metallurgists have given the name of kalgoorlite to the tellurium found there. This metal contains in many places an almost pure tellurium of gold.

WITH an assayer's certificate of the assay value of ore, concentrates and tailings, to know how many tons had been put into one, if from the assay value per ton of ore and of headings there he extracted the assay value per ton of tailings, and the lesser remainder divided by the greater, the quotient represents the "number of tons put into one." Ore containing free gold amalgamated in batteries or on plates should have the sample for ore assay taken from the pulp delivered to the concentrators. The assay value of the original ore may then be found by dividing the value of the amalgam by the number of tons

crushed, and adding the result to that found by the assay of the pulp going to the concentrators. This would give about as accurate a result as sampling from the rock breaker.

A METALLIC ARSENATE in roasting is decomposed by the joint action of sulphuric anhydride and a weak reducing agent, like sulphur, iron or copper, the former decomposing the arsenate and the latter reducing the stable arsenic oxide to the volatile arsenious oxide. The presence of a powerful deoxidizing agent like charcoal is liable to reduce the sulphuric anhydride and prevent its decomposing metallic arsenate. The probable reason why the arsenic is not wholly expelled toward the end of the roast is perhaps due to the fact that the ore was not ground sufficiently fine for the sulphuric anhydride to reach the centers of the particles of ore.

WHILE garnet as an abrasive material is in commercial use, yet the garnet properties mentioned in the Massachusetts inquiry would not seem to be an encouraging commercial proposition, as, apart from emery and corundum, the artificial production of corundum at low price for abrasive purposes would seem to work against the suggested development of a garnet property. The manufacturers of corundum produced 3,838,175 pounds in 1901, valued at \$345,435, as compared with a production of 2,401,405 pounds the previous year, valued at \$216,138. Of garnet the 1901 production was 4713 tons, valued at \$159,238. The 1901 production of corundum and emery was 4305 tons, valued at \$146,040.

UNDER a recent ruling the Secretary of the Interior has held that mining claims which lie so contiguous to one another that taken altogether they form one body of mineral land, are all properly developed by a tunnel through which it is contemplated to work the entire property, and that a claim "which is a member of such a group does not cease to be a beneficiary of such work or improvement in proceedings for patent simply because and for reasons sufficient to the owner of the group, such claim or location is not embraced in the first proceedings for patent to one or more locations in the group in which part of such work or improvement is duly credited under Section 2325. It is immaterial so far as receiving credit under that section for its due share of the value of the work is concerned when proceedings for patent to such mining claims or locations are commenced by such owner, or whether the proceedings embrace one or more of the locations. These are matters for the owner. His right to have the due share of work or improvements, or other value credited under Section 2325 to the several members of the group of claims is not in any way dependent upon his embracing them all in any one application and entry. If he complies with the mining laws in other respects he may apply for and enter them singly or in pairs, or otherwise, at his option, without in any way impairing his rights."

BETTEL'S PROCESS is the electrical precipitation of gold or silver on zinc shavings, using a coated lead anode, the current being of such volume that a tension is produced higher than the back electro-motive force between zinc and oxygen in a cyanide solution of whatever strength may be used. The zinc does not appreciably dissolve; and the gold, once precipitated, never redissolves. In the boxes, solution can be put through continuously, if required, for three months without attention, provided a constant current be maintained and the solutions entering the boxes are filtered. If zinc be present in the solution it is precipitated as a flocculent sponge carrying some gold; a filter interposed between the boxes and the sump is therefore occasionally required. The zinc, when taken from the boxes, has a jet black appearance, and is in condition to transfer to extractor boxes of the sands plant, using ordinary zinc precipitation. The Betty or zinc-lead process consists of the ordinary zinc process, the zinc being lead-covered by dipping in strong acetate of lead solution and a strong solution allowed to flow into the head of the box to promote electrical activity of the zinc-lead couple. The zinc-lead couple retains its activity for a time, varying with the impurities contained in the solution. In solutions saturated with zinc ferrocyanide the process may only be effective for forty-eight hours, unless a heavy dose of cyanide is introduced. At other times it may go nearly a month without the effluent being higher than nine grains of fine gold per ton. The oxidized zinc with adhering oxides and ferrocyanides is transferred to the ordinary zinc extractor boxes, where the coating is removed by and dissolved in the strong cyanide solution at the expense of the precipitation for the time being.

T. A. EDISON'S magnetic milling process is a metallurgical fact and a purely scientific success, but not from the commercial point of view. The most recent described experiments with his device were at Baham, London, England, where in a small building were arranged the series of magnetic separators on which the process depends. The ore was first crushed to a gunpowder-like form by machinery, capable of reducing blocks of ore weighing five tons. This powder, consisting of magnetite, hematite and earthy matter, was exhibited, and it was shown by preliminary experiment how the ordinary magnet, while snatching up the magnetic particles with great force, left the hematite element practically uninfluenced. Then the first step in the separation was proceeded with. The crude powder was dropped in bucketsful through a separator containing magnets on the ordinary principle, and the magnetite, deflected by the magnetic action, was seen to pass in a steady stream into one receptacle, while the dross, or

gangue, and the hematite dropped into another. Then remained the more difficult problem of the separation of the hematite from the earthy dross. The mixture remaining after the first process was passed through the second separator contained magnets on the new Edison principle. The magnets at once attracted the hematite metallic particles, hitherto considered practically unsuspensible, and, after collecting in a brush-like formation, they dropped steadily into the receiver, while the earthy matter found its way out of the machine by another exit. The process continued with absolute continuity and great rapidity, and there was no hitch of any kind. A second and third milling extracted what little metallic matter remained, leaving only sand and other useless detritus. The process eliminated phosphorus, and the separated metal appeared bright and pure, only requiring to be formed into briquettes to be ready for the furnace.

IT is not uncommon to see large sums spent in hunting ore along the edges of some worked-out ore shoot. In other cases the barren vein areas between shoots is explored by the same close and expensive network of shafts, winzes and levels that would be used within the areas of the shoots themselves. Since shoots stand up and down in a vein, there is more chance of striking one by horizontal than by vertical workings. Incidentally the former are much cheaper. Notwithstanding this, the chief hopes in development work are apt to center on the shafts and winzes, because these gain depth. The old and never-dying delusion that mines always improve with depth is partly responsible for this. As a matter of fact mines improve when any working gets into an ore shoot. But now and then some shaft headed for the earth's center chances to run into a shoot on its downward slope. The same shoot might have been found with little delay or expense by a short level from the shaft while it was shallow. Indeed, it may come to the surface and a little skillful prospecting expose it there at the beginning of operations. Nevertheless such strikes are always heralded as proof of the depth theory. When mining in fissure veins a part of the development work is often wasted by being "run off the vein." The filled and cemented fissure which constitutes a vein of this class is not often a simple, clean-cut break. Like any other fracture in a solid mass, it has branches, crossings, side bows and parallel crevices in every conceivable form. These may be distributed through a width of 20 to 100 feet and are more or less connected by interlacing crevices. It is not easy and is sometimes impossible at first sight to distinguish the principal ore-bearing fracture or "main vein" from the others. At every split there is a chance of following the wrong clew and the sum total of such possible errors in a single mine is evident. The difficulties are increased by the fact that an ore shoot frequently jumps from one crevice to another and mine levels, therefore, pass by it. In addition to the difficulties of identifying the main crevice of one vein, are those which come from the existence of other veins close by. Every time the vein must be reached anew by a lower shaft, crosscut or tunnel, there is danger of mistake. There are no tags on the veins and a large expenditure of good money on the wrong one is a familiar sight.

THE so-called regeneration of burnt steel is most simply accomplished in the following manner: Heat the steel several times to a dark red, and quench after each heating in hot water. The steel finally recovers its former qualities. The first heating and quenching has the strongest effect, which gradually becomes weaker until after the fourth or fifth treatment the steel is affected no longer. From this it is evident that three or four temperings are usually sufficient. By examining the fracture surface of steel thus regenerated it will be found that its grain has become as fine as it was before burning; in fact, its structure is identical with that of similar steel hardened, but which had not suffered any previous burning. It is, however, always to be understood that the above mentioned chemical change of the steel in regard to its carbon contents has not taken place simultaneously with its burning. In this case the simple tempering method is of no avail, and the steel has to be subjected to a different treatment, according to the circumstances. If the steel has absorbed too much carbon, it should be heated slowly, allowing free access of air; if it has lost too much carbon, it has to be recarbonized before hardening. This is accomplished by putting the tools or other steel articles to be treated into boxes of sheet iron or crucibles and imbedding them singly or collectively in powdered bone or charcoal. After the boxes or crucibles have been closed tightly, these, together with the contents, are heated for about one hour, when the articles are taken out and tempered in water. Frequently heating in closed vessels is dispensed with, and simple hardening means applied to the articles. In this case, for instance, ferrocyanide of potash can be sprinkled on the articles after they have been heated to a brown red, and they are then tempered in water. A number of means for regenerating burnt steel are in use, and either one or the other is recommended by their respective champions. Some favor pure water, but others prefer stronger mixtures. Two recipes are given: (1) Ten parts of resin, five parts of fish oil, three parts of mutton fat. When employing this mixture the steel is heated to a dark red and quenched in the molten liquid, after which it can be tempered in the usual manner. (2) Ten parts of mutton fat, ten parts of linseed oil, one part of lamp black. This mixture is melted and the steel manipulated in about the same way.

California Miners' Association.

The eleventh annual convention of the California Miners' Association met at Golden Gate Hall, San Francisco, on the 17th inst. Speeches of welcome, letters from State officials, and President E. C. Voorheis' address occupied the morning session. Among other things he said:

"The officers of this Association have been untiring in their efforts to secure the passage through Congress of what is known as the mineral lands bill. All of our Representatives in Congress have worked faithfully and hard for this bill, but so far we have failed to secure its passage. We will keep up the good work and try, if possible, to overcome the objections to the bill. If we fail to do that, then we must try to pass it in spite of the objections.

"We are in favor of some measure being taken by the general government toward the conservation and the storage of flood waters, which, if it could be accomplished, would be of incalculable value to the farmers, as well as to the miners, of the entire State.

"The mineral production of the United States is reaching such vast proportions that it is only a matter of short time when the Government of the United States will be bound to recognize our claims and give us a special Department of Mines and Mining, with a Cabinet officer at its head. If we could induce the Representatives from other States where mining is carried on extensively, whether it is gold, silver, copper, coal, iron, petroleum or any other mineral substance taken from the earth, to join with us and ask this recognition, I think we would be successful in having a Department of Mines and Mining established.

"Look at our vast stores of oil, mountains of timber, building stone, iron, copper, gold and silver—in fact, nearly all of the minerals that are useful to man. We are here and all we have to do is to embrace the opportunity which is now offered us, and become the second pioneers and carry on the work laid out for us by the hardy forty-niners who only came here to dig a fortune out of the earth and then return to their homes to enjoy the remainder of their days.

"If they could return in fifty years from now and see California, the greatest State in the Union, with thousands of ships coming and going through the Golden Gate, railroads running from one end of the State to the other, factories of all kinds located over the State, storage reservoirs built all through the hills and mountains to take care of the flood waters in the winter and to be used for irrigation in the summer, the mountain streams all harnessed to electric generators, thus easily distributing cheap power to the factories and farms, then, indeed, they could well be proud that they laid the foundations for this vast empire."

President Voorheis also referred to the prominent part played by the California Miners' Association in securing the passage by Congress of the act authorizing hydraulic mining under certain restrictions. Since that Act was passed, 469 permits have been issued to mine and employment to several thousand has resulted, while great stores of gold have been added to the world's wealth. President Voorheis also referred to the work of the Association to secure restraining barriers in the principal streams of California and to the beginning of work on the barriers in the Yuba river to cost \$800,000.

B. I. Wheeler, president of the University of California, gave an address on the advantages of college training and cited individual instances of the world's demand for trained men in all departments of mining and metallurgy. Of the mining college he said:

"The course is so planned that the mining student is thoroughly grounded in the scientific bases of his profession. He has been taught how to use mining machinery. He has gained an insight into the actual conditions of the life of the mining engineer and of the miner who works with his hands. He has been shown how to go to work on the solution of the infinitely involved problems which will continually arise throughout his professional life.

"The graduates of the College of Mining, as was to have been expected, have scattered far and wide over the world. In South Africa the number of mining engineers trained at the University of California exceeds the number from any two other American universities. Others of our graduates have scattered throughout Central and South America, in Australia and Tasmania, in China and Japan, in Mexico and Alaska, and in every mining region in North America."

"Machine Drilling by Compressed Air" was the subject of a practical article from a working miner's standpoint by H. P. Stow, manager Gold Bank mine, Forbestown, Cal., followed by C. T. Deane, of the California Miners' Association, who read a paper on the oil fields of California. He stated that there are 2500 producing oil wells in California, which are in fourteen districts. The production of petroleum in California was 4,000,000 barrels in 1900; 8,000,000 in barrels in 1901; would be 12,000,000 barrels in 1902 and probably 20,000,000 in 1903. By 1905 he thought the total petroleum output of the State would amount annually to 50,000,000 barrels.

Alfred von der Ropp, superintendent of the Selby

Smelting & Lead Co., Selby, Cal., read a valuable paper on petroleum as a fuel, it being his experience that it afforded a 50% saving on smelting operations. He made manifest the necessity of expert construction and handling of the plant, and that "fuel oil" as a generic term was too elastic, the crude petroleum being the requisite specific substance for that kind of fuel.

The second day's proceedings were signalized by the discussion of the Polar Star case in Placer county, Cal., it being decided that notice of appeal be given from the decision of the Superior Court.

J. B. Tregloan read a paper on "Electric Power for General Mining Purposes," in which he said that electricity at \$6.50 a thousand H. P. per month about equals water at 20 cents an inch under 500 feet fall and that applied direct it costs approximately half as much to operate machinery by electricity at \$6.50 per thousand H. P. per month as by steam engines with wood at \$6 a cord at the furnace; that \$17 worth of fuel oil at \$1.50 per barrel would do the same work as \$24 worth of pine wood, at \$6 a cord, for hoisting purposes; electricity at \$6.50 per H. P. per month would save \$150 a month over water at 20 cents an inch under a 135-foot fall. At the Oneida mine, in Amador county, where pumping is done by electricity, 200 gallons of water a minute can be raised 1300 feet vertically through a 6-inch pipe, using 100 H. P. electricity, at a cost of \$3 40 for four and a half hours' duration. Additional H. P. could be obtained by using twenty-four pounds of coal for reheating purposes. It takes from 96 to 120 pounds of good coal to get a H. P. from steam for twenty-four hours.

W. C. Ralston read a paper on "Flume Construction," giving the details and cost of the upper two miles of a 4-mile flume in Calaveras county, 10,462 feet long, 8x4 feet, huilt from the lower end up. "Generally," said the speaker, "it is considered cheaper to begin at the head of the flume and construct down stream, floating the timber in the flume. I decided this was not economical because in the excessive heat which prevails in our section during the fall our lumber would have checked badly. It would have required the handling of the lumber more often. Men would have to walk in the water or complete the flume as they went along, even to the walking board. A new idea to most of us was suggested by the foreman. A low truck was made with axles wide enough to run on the outside stringers, and with this mode we could run our lumber out and keep a long way ahead with our bents. We immediately laid the floor and used it as a wagon road to haul our lumber with a single horse in shafts, the wheels of the trucks being 10 inches wide, made of a cut of a tree, and with two 4x2-inch iron tires. It will be seen from the list of lumber used that our sides were of 1½-inch plank. That is too light, as it should have been made of 2-inch plank. The 1½-inch plank springs away from the hatten between the posts. If anyone contemplates building a large flume of this description, it would pay to make a contract with the sawmill to have all your lumber cut and squared to exact lengths, except the bottom plank, on account of the bends, to have the stringers sized up to the proper thickness and to have all the caps gained."

A. M. Hunt followed with a paper on "Petroleum Oil as a Fuel." He maintained that with crude petroleum as a fuel motive power can be produced more cheaply on the shore of San Francisco bay than by the transmission of electric power 200 miles from sources of water power in the mountains.

"The amount of copper wire," said Mr. Hunt, "required to transmit 50,000 H. P. a distance of 200 miles at 10% loss under normal conditions is approximately 16,000,000 pounds. It would be absolutely necessary to erect at least two distinct and separate transmission lines in order to guarantee continuous operation. I have figured on using a form of tower construction that would make stability the first item of consideration, and would give as my estimate of the cost of such lines \$3,500,000, which would cover cost of material and erection, rights of way and other things.

"I will take first the cost for horse power when it is taken twenty-four hours daily for 365 days a year. In the case of the water-power plant it is immaterial what the number of hours may be. The cost of the operation per horse power of a plant installed remains the same, as the operating cost is a lump sum, which does not vary with the number of hours use is made of the current. I have assumed for the purpose of calculation that interest, depreciation, taxes and all other charges against the pole lines will be covered by 12% on the investment therein, and I think that this is in no way excessive. The total charge, therefore, against the pole line would be \$424,000 yearly, or the sum of \$8.40 per horse power per year. Under similar circumstances operating the steam plant twenty-four hours daily and 365 days a year the output of the steam plant per horse power installed would be \$19.68, showing a very great advantage for the water power.

"There is little or no probability of the cost of transmitted power being reduced. The only way in which the charge under consideration in the present instance could be lowered would be by increasing the voltage at which the line is operated. As against transmitted electric power brought from the mountains and steam power generated on the hay by fuel

oil, the steam plant has the advantage and will have."

"The Preservation of the Forests" was the title of a paper by A. D. Foote, who took strong position in advocacy of measures to prevent the destruction of the forests by fire:

"All else of forestry can wait. Regulation of cutting; deposition of brush; replanting; reservations for the conservation of water; all the work of modern intelligent forestry will be of enormous value in keeping up our forests, but our present work is the prevention of fires. It is proposed that the California Miners' Association take the initiative in the prevention of forest fires in this State. At the proper time a resolution will be offered for your consideration embodying the idea that your committee on legislation shall prepare a bill and urge its passage through the next Legislature, which shall appropriate \$50,000, or whatever sum the committee may think necessary, for the purpose of paying a fire patrol to put out forest fires, said fire patrol to be organized and controlled by the University of California through its School of Forestry. Your committee will naturally invoke the aid of the Water & Forest Association, the Sierra Club and the superintendents of the United States Forest Reservations in the State, both in the preparation of the bill and in its passage through the Legislature, and there is no doubt of their hearty co-operation.

"It is particularly appropriate for the Miners' Association to present and carry forward a method for the preservation of our forests. We have the reputation not only of destroying them, but of tearing down the hills on which they grow. If now we come forward and keep them growing, we become protectors of the forests, and we also stop the surface wash and the sudden floods, which, far more than the hydraulic mining, have made our valley friends think we were sending the mountains down upon them."

Treasurer S. J. Hendy reported balance on hand a year ago \$2983.24; total receipts from secretary during the past year, \$1587.20; total, \$4570.94; disbursed on warrants this year, \$3330.33, leaving a balance on hand of \$1240.61.

After the morning session there was an adjournment to the University of California grounds at Berkeley, Cal., to attend the laying of the corner-stone of the new mining building. (An account of this will appear in next week's issue.)

Upon reassembling on the 19th, the third and last day of the convention, the committee on dams and ditches reported, in which a recommendation was made that Congress and the California Legislature be requested to provide for the barriers suggested, and that future operations cover simultaneously all the rivers and tributaries requiring protection of the nature proposed for the Yuba river. The report says:

"It will be noted at a glance that we have entered upon a new era in the effort to solve the hydraulic mining question. We now face actual results. We look into the future without any misgivings. We are filled with boundless hope, based on reasonable and defensible grounds, seeking only that which is right to the mining interests and desiring to do right to all other industries.

"This era not only ushers into existence the barriers on the Yuba, but opens the way, let us hope, in the near future, to the construction of like barriers on streams throughout the mining field.

"The crowning glory of the struggle in which we have been engaged is that, while we have sought to help ourselves, we have not desired to injure others. Indeed, the foundation of the result of our work is based on river improvements for drainage as well as for navigation purposes. Complete protection—aye, better protection than has heretofore been afforded—to adjacent lands must necessarily accompany such improvement. In the system contemplated one cannot exist without the other.

"In view of this fact, and considering that the Bear, American and other streams draining the hydraulic mining areas to the south of the Yuba for the purpose of protection to navigable waters and adjacent lands require the same treatment as that now proposed for the last-named river, it is, as we stated in a former report, 'a source of great regret that litigation has ensued concerning hydraulic mining operations in this State on the suggestion of the Anti-Debris Association, at a time when proposed plans promise so much, both for the farmer and the miner. The Act of 1893, regulating hydraulic mining in California, was conceived in a spirit of harmony. By its river provisions, which are identical with those of the Mississippi river law, the river interests of the Sacramento and San Joaquin valleys and the adjacent lands are afforded ample and permanent relief.

"The completion of the Yuba river barrier will, so far as the river is concerned, give effect to the law of 1893 in its entirety, and for the first time will put in operation its river and its mining features in meeting and overcoming, we confidently believe, the difficulties of the farmer and of the miner. The labors of this organization at this stage are just commencing to bear fruit, and must be kept up with vigor."

H. Z. Osborne read a paper on "Gold Quartz Mining," in the course of which he said:

"Having found the vein and determined that it

contains values sufficient to justify further development, the question frequently arises as to how the work shall be done—whether by shaft or tunnel. The ground may be so flat that a tunnel is impossible, and of course there is then no room for choice. But in California most gold prospects are found in hills and mountains, and a great amount of tunneling is done. The tunnel obviates the expense of hoisting and it drains itself. If it can be run on the vein, and too long a drift is not required to reach the ore shoot, it is often the most satisfactory and least expensive way of opening the prospect. But frequently a considerable crosscut must be run before the tunnel intersects the vein, and then a drift, to reach the presumed ore body. These crosscut tunnels are the rock upon which many a poor prospector, and indeed many a large corporation, has split.

"It is a most natural thing for a man to picture his vein in his mind as running on practically geometrical lines, and as dipping at a certain angle that is fixed in his mind by its appearance at one or more places. In nature, however, the vein rarely continues far on straight lines, either in strike or dip. On the contrary, it has many deviations from what may be considered the general course and dip. As to the dip, it sometimes turns over and completely reverses it. So in running crosscut tunnels, when one has figured out mathematically the point where he should intersect his vein, he may not find it there, because a change in either its strike or dip may have occurred between that point and the last point where he had an opportunity of observing it.

"Again, his crosscut tunnel may be headed for a point directly beneath where the ore shoot showed at the surface. This, however, does not insure his striking ore when he reaches the vein, even though the ore shoot extends to a far greater depth than the tunnel level. The ore shoot has its course, or strike, in the vein, and while that strike downward is sometimes vertical it is rarely so. Generally, if the vein is a northerly and southerly vein, the strike of the ore shoot is either one direction or the other, and some development is required to decide what that strike is. So the crosscut, even where apparently headed straight for the ore shoot, may enter the vein where it is barren. This may be corrected by drifting; but it is discouraging, and one may be at a loss to know which way to drift, and finally take the wrong direction.

"The shaft or incline is more expensive—that is, more expensive per running foot—but is generally the most satisfactory way of opening a prospect."

Professor S. B. Christy followed with a paper on "The Cyaniding of Concentrates." G. J. Henry read a paper on "The Design of Water Wheels for Use in Mining." M. Lindley read a paper on the "Copper Production of Shasta County."

The committee on resolutions again indorsed "the new national demand for a Cabinet Department of Mines and Mining," asked the Legislature to "place the Mining Bureau upon a proper basis by making a sufficient and permanent appropriation for its support," and recommended that the law under which the Mining Bureau exists "be so amended that the management and direction of the bureau and the field work he under the control of the board of trustees;" indorsed the administration of the State Mining Bureau, commended State Mineralogist Ahury, discussed the development of water resources and the preservation of forests, and called for immediate and thorough investigation of water resources, the best method of improving and developing the same, the investigation to be with the collaboration of the National and State Governments, the Legislature to make a proper appropriation for the same. The creation of forest reserves in certain sections was opposed.

On this point it was resolved: "That it is the policy of this Association to encourage the establishment of forest reserves in localities where the same may be established without great detriment resulting to the State therefrom, and where the results therefrom would be beneficial to the State; and though we adhere to that policy, yet it is the sense of this convention that the conditions are not such as to justify the setting aside of the territory proposed and believe that the establishment of such wholesale reserves would result in great injury without any compensating benefit; be it further resolved that this Association recommends a reclassification of such lands embraced in the territory withdrawn, where mining development is in progress, into mining, timber and agricultural land, to the end that the mining lands of the public domain may remain open to location as mineral land."

The usual resolutions were adopted favoring the mineral lands bill; the amendment of the Revised Statutes of the United States concerning the location of mining claims; and requesting the Secretary of the Interior to issue instructions to the local land offices that all lands embraced in dry lakes shall be noted as saline in character and that the burden of proof shall be thrown upon applicants to enter the same to show their agricultural and non-saline character. Resolutions were also adopted asking for an appropriation by Congress for building additional restraining dams and barriers upon the tributaries of the Sacramento and San Joaquin rivers and their branches to the end that hydraulic mining may be resumed in all parts of the State adapted therefor. Further reso-

lutions requested the Secretary of the Interior to provide for geological folios for quadrangles in the northern counties of California and also hydrographic data; instructed the Association's committee on legislation to formulate and urge upon the State Legislature a bill for an appropriation to provide for a fire patrol for the protection of the forests of the State, the patrol to be under the direction and control of the University of California; and also asked the State Legislature to provide a liberal appropriation for a comprehensive exhibit at the Louisiana Purchase Exposition.

The report was adopted unanimously by the convention without discussion or amendment.

Chas. M. Belshaw of Contra Costa Co. was unanimously elected president for the ensuing year; the other former officers were re-elected, and the convention adjourned sine die.

Steam Plant for Gold Mines.

Written for the MINING AND SCIENTIFIC PRESS by CHAS. H. FITCH.

While the prospectus of a gold mine is usually sanguine of large and permanent results, the promoters are usually shy of ready money for an economical mill equipment, and assume that they can go in and succeed on the strength of the value of their ore, which is counted upon to cover heavy operating expenses and bring them in a surplus which will pay for a larger and better outfit, after which will follow a hauling in of rich revenues. Hopes are so high that the big end of difficulty is cheerfully put first. In other words, a start is made with had management, and the richness of the mine is expected to overcome this handicap. In most cases this is too much to expect of the mine, therefore the mining enterprise fails.

But what help is there for it? The costs of transportation are enormous in a rough, new mining district. At Roosevelt, for example, in the Thunder Mountain country, Idaho, everything that goes in costs 20 cents a pound additional. It has cost \$1200 to get a \$400 piece of machinery to some Central American mines; and in West Africa the jungle is described as so thick that it has to be tunneled, and all machinery must be sectionalized for carriage by one or two men, sixty pounds being a one-man load and ninety pounds a two-man load, the machinery delivered at the mine costing as high as 40 cents a pound. On the other hand, coast mines get their supplies cheap, and machinery is delivered for the Alaskan coast mines at Juneau and Douglas at prices which cannot be approached by most of our Rocky mountain mines.

It is to the interest of all that good policy should be followed. Because an installation of power plant costs so much, it is the more imperative to be sure of the mine; then put in a good plant. To put in a poor, cheap plant because you are not sure of the mine is to make an uncertain, miserable beginning which can only come out right with a very rich mine, while it increases the difficulties of developing an average mine so much as to make discouragement and abandonment of the project almost certain.

I would be willing to sell a cheap outfit of machinery to a company that insisted upon it, but I would not take stock in such a company because I would consider it as evidence that they had not learned their mine, and were "chancing" it in a very hazardous way.

The first thing is to have, and know you have a mine. The second thing is to provide a large power. In the dry mining sections of Arizona it is a trite remark that a water supply is more important than a gold mine, for the water is necessary to power, and without power a gold miner is poor indeed.

"You love life," said Franklin, "then value time, for that is the stuff that life is made of." In a like spirit we might say: "You seek gold, then value power, for that is the stuff that makes gold getting possible."

But power is recklessly wasted about mines. This applies to all of the small mines and a great many which might be described as large enough to know better. Now here is a bit of rational philosophy which might apply even in the case of a small mine in which, from the necessity of the case, power cannot be as economically generated and applied as where it is employed in larger units. Even for a small mine it is good philosophy not to have any avoidable waste of power. If I have a 10 H. P. engine and holler close to their work, with protection against waste of friction by lubrication, and against waste of radiation by covering, and against waste of the lower range of heat by feed heaters and economizers, it is more economical than to put in a 20 H. P. boiler and engine and waste more than half the power. A little overloaded engine, with the covering and auxiliary protection against loss of power as described, will not generally be at so great a disadvantage as a large underloaded engine, with its power leaking away in wet steam and cylinder condensation and in radiation from the accompanying large boiler.

Of course, the covering and the heaters, economizers, good bearings and devices for lubrication cost money, but they do not cost as much as not to have them. This reminds one of the boy's definition of salt as a substance which made things taste bad when it was not in them. The heat savers are the

things that make a steam plant costly when it has not got them, for in them we have a certain cost of apparatus, while the same additional cost put into a larger plant and half wasted means not only the same extra first cost, but also the fuel and operation of the equivalent of a 10 H. P. engine as pure uselessness and extravagance.

Bankers get rich from small increments of interest, note shaving and charges on exchange and collections, but they are like a leak in the bottom of a cistern to the man who has to pay them. Now which is better—to have a tight cistern or to let it leak, and put in a pump of double power to make up for what runs to waste? The answer to this problem is all the difference between thrift and shiftlessness. The wastes are as the architect said of the window—"a hole to heat."

We buy the machinery once for all, or for a term of years with some small tax for repairs, but we buy fuel continuously; we pay a good salary to the coal or wood pile, and it behooves us to see that half of its work is not wasted.

Occasionally when I strike an idea, not a new one (most good ideas are renewed ideas—ideas that have seen the light before, and have been turned down and left for some one else to get the dust off from them and drag them out at a later date)—occasionally, I say, when I strike a good idea and show it up for approval ready to be acted upon, I am disposed to stop short and ask myself, "What is the use?" We have been preaching for centuries since the year one, and the sinners still seem to be the liveliest people in the community.

So the men who make things go, who have the nerve to risk and the diligence and energy to push a new undertaking such as the development of a mine, almost always go about their work raggedly and succeed in spite of their lack of grace, where they succeed at all. And these economic sinners have something to say for themselves. It is a had sign, they say, for a man to be too elegant in going about a mining enterprise, because it is noticeable that when a concern goes in to do prospect work with the best of everything to be had, it almost always spends a lot of money and quits without getting it back.

Then, again, what can we do to comply with fine spun theories of economic efficiency? There is the machinery market. Go and buy for yourself. It is hard enough to get a plain outfit without delay; and if you require frills, the expense is out of proportion to their value when you have not got the price, and the delay is out of the question when you have not got the time.

So much for the miner's end. The manufacturer does not connect with him properly. Pipe covering and oil filters and damper regulators, feed heaters and economizers are all to be had; but if I were to design an ideal small steam plant, I would say here is a 30 H. P. plant. It will cost you 60% more than the ordinary plant that you buy, but it will save more than half your fuel. I have everything made up in stock ready for shipment, have spent a good deal of money getting ready to give you a benefit—will you take it?

The equipment so provided would have a very slow sale, and would not be very profitable to handle. Its commendation would be received with more or less distrust, and why not? Is not the hard, matter-of-fact machinery world full of fairy tales of higher efficiencies and percentages of saving which are not always realized under common conditions of use. We all know what beautiful fruit is grown in the catalogues of the seedsmen; but when we buy their seed, our soil is not always suited for the production of the same results. The pictures are like the prices—subject to discount.

But counterfeits prove the existence of the genuine, and many prophecies only wait for a little more wisdom on the part of all concerned in order to be brought true. To a young man (a willing sacrifice of energy to ambition) it is encouraging to know that the world is not finished. There is a wide margin yet for applied intelligence.

Undeveloped Iron Deposits.

Much thought and many figures result from the fact that the iron deposits of the Middle States are being carefully prospected to determine just how long the ore bodies will supply the demand. Organized capital is at work to secure control of iron ore deposits. A large tract of iron lands in northern Michigan has been secured by the Clarion Steel Co., a rival of the United States Steel Co., the value of the property being stated to be \$60,000,000. This purchase, however, will save the owners for only a few years comparatively from the necessity of succumbing to the United States Steel Corporation, which controls the steel trade of the country; nevertheless the Clarion Co. understands the elements of resistance.

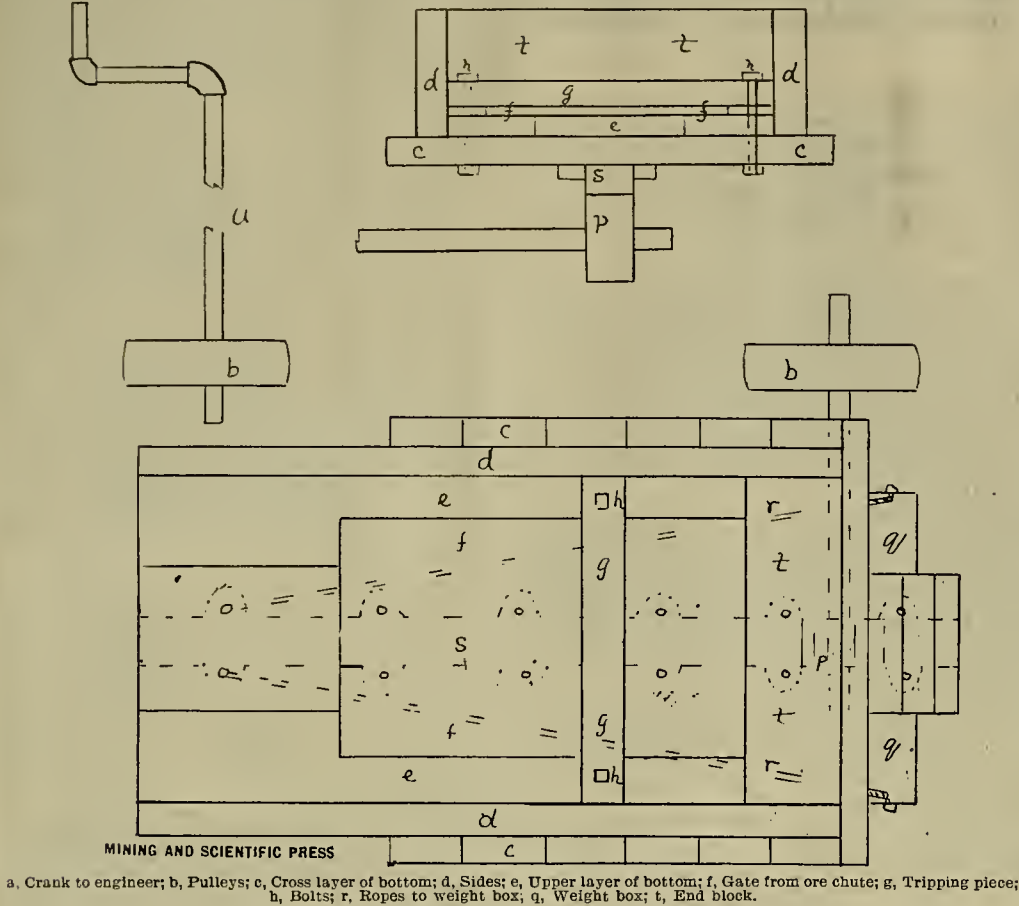
Little iron is now manufactured west of the Rocky mountains, but California has magnetic and hematite ores, from which could be produced the same quality of iron as is made in Russia or Pennsylvania. The consumption of pig iron west of the Rocky mountains is now estimated to be about 512,966 long tons for last year. In addition, the increased amount of heavy mining machinery employed in the new mining districts largely augments this estimate. Such con-

As before turns bottom up over a car running alongside the shaft, the top of the car flush with the bottom of the door. In unwatering the shaft, and hoisting from a sump while drifting, a water harrel with a bottom valve is used, the 2x4 taken off, the filled harrel let down onto the door, the water running off the door to the drift. The bottom of this drift, near the shaft, was all carefully filled in with concrete, so that there is no leakage back into the shaft. All

parts of the door, slides, etc., where wear comes are covered with strap iron, the sliding surfaces kept greased.

This arrangement has been in use the past three

holder of the claim is to be given the benefit of the doubt. On this very point raised by our enquirer the then Commissioner of the General Land Office, Williamson, says:



a, Crank to engineer; b, Pulleys; c, Cross layer of bottom; d, Sides; e, Upper layer of bottom; f, Gate from ore chute; g, Tripping piece; h, Bolts; i, Ropes to weight box; j, Weight box; k, End block.

seasons. It has given entire satisfaction and enables the engineer to handle water very rapidly and easily. I enclose you some sketches of this device drawn to scale 1 inch to a foot. E. L. BALLOU.
Pony, Mont., Nov. 9, 1902.

Expenditure on Unpatented Claims.

Kindly answer through "Concentrates" or otherwise the following: This company has bought seven separate, but contiguous, placer mining claims, to work which we are building a dredger, and, of course, are spending many times the amount required by law for annual assessment work. Will the money thus expended on this dredger and other improvements, intended for the benefit and to enable us to work all of these seven claims, apply as annual assessment work on the said claims? When the dredger is completed and working, will the money expended for operating expenses during the season, if sufficient in amount, cover the requirement of the law as regards annual assessment work? Or do we have to get out and do \$100 worth of work on each of the seven claims?

If the matter is of considerable importance, as would appear to be indicated by the building of a dredger, it is probable that the safer plan would be to consult a competent lawyer, and he guided by his advice. It is likely, however, that if dredging will be done the accompanying incidental work will aggregate considerably more than the amount of "annual assessment work" necessary to legally hold the claims. As a general proposition, however, the question is an interesting one.

From the County Court up to the Supreme Court of the United States it has been shown, over and over again by decisions, that the intent and desire of the statutes are to require every one asserting an exclusive right to a mining claim to expend something of labor or value on it as evidence of good faith, and on this broad ground, if our inquirer could show that his company's \$40,000 dredger was designed to work those placer claims, that would probably be sufficient, unless there were a contest, when he might have some difficulty in answering a contrary allegation that the dredger could be used elsewhere and was not solely applicable to the development of those particular claims. That is, while the required labor can be applied in any way or manner, it must be in such a way or manner that will show it is unquestionably devoted to and intended for that particular property. Just whether a dredger that can be floated 40 miles away in a day can be shown to be built especially for "that particular property" might be an awkward question if the question was raised, and if the question wasn't raised it wouldn't make any difference if there wasn't a dollar spent on the seven claims in work or improvements.

The general ruling of all the courts and public officials is, however, lenient, the idea being that where there is no manifest attempt to evade the law the statute is to have a liberal construction and the

"All improvements made upon a mining claim having a direct relation to the development thereof may be taken into consideration. * * * Any building, machinery, roadway, or other improvements used in connection with and essential to the practical development of the claim."

This would embrace the question submitted. "Lindley on Mines," discussing this subject, also says: "Labor and improvements within the meaning of the statute are deemed to be done on a mining claim * * * when the labor performed or improvements made for the purpose of working, prospecting and developing the ground embraced in the location, or for the purpose of facilitating the extraction of the mineral it may contain."

These last citations would seem to warrant the belief that the work on "the permanent improvements intended for the benefit" could be considered as sufficiently complying with the requirements.

Imperial Cyanide Method.

At the Highland Chief mill, Spruce gulch, Deadwood, S. D., operated by the Black Hills & Denver G. M. Co., is the Randall system of slimes treatment. The apparatus consists of a series of cone-shaped settlers with a specially formed bottom and a special method of introducing the material near the center and directly over the central bottom discharge opening, whereby rapid subsidence of the solids is effected while the separated and clear solution carrying the values flows continuously over the top of the settler and is caught in a suitable launder.

Twelve tons per day fine, clayey slimes, twenty-eight tons sand, making fifty tons ore, and 200 tons of cyanide solution go through the battery; but only forty tons of this solution is in stock, as it is used over and over again. The sand is taken out in a hydraulic separator when the remainder of the material is ready for the special treatment. This consists in decanting off the battery solution from the first settler and returning it to the stamps. The thickened slimes, consisting of 40% to 50% dry solids, is drawn from the bottom of the cone in a continuous stream and forced to an agitator and washer placed over and discharging into the second settler. In this washer it meets several times its own weight of wash decanting from the third settler. After this first wash it flows into the second settler, subsides to the bottom and is forced to the second washer, while the wash carrying the values goes to the battery circuit to be further enriched before going to the zinc extractors. The slimes receive as many washes as desired by providing the proper number of settlers; the operation is continuous and automatic. The saving of values is stated to be as follows: Moisture (battery solution) in slimes leaving first settler, \$5.20 per ton; moisture in slimes leaving second settler, \$1; leaving third settler (after two washes), 12 cents per ton. The wash is composed of sump solution continuously taken from below the zinc boxes.

A Modern Gold Mill.

On page 298 is a description of the first stamp mill in operation in the United States, nearly seventy years ago, the prototype of hundreds of great gold mills throughout the West, of which the new Portland mill at Colorado City, Colo., is a good example.

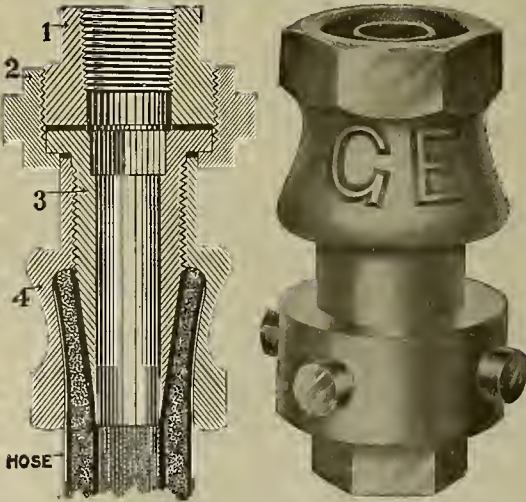
The Portland mine, in Cripple Creek district, last year produced 77,000 tons ore and this year will produce about 100,000 tons. Upon the treatment of that ore depends all the difference between profit and loss. The possession of a suitable mill, properly located, gives opportunity for the exercise of the little economies and savings that make or mar any business. The custom mills allowed the Portland Co. \$20 per ounce for the gold; the Portland mill sells the product—\$20.67 per ounce—direct, the 67 cents amounting to just \$55,000 on the 77,000 tons ore handled last year; that \$55,000 is 6% interest on \$916,000. The cost of the mill was \$500,000. The mill is treating its own ore for \$4 per ton, saving \$3 a ton—a yearly saving on the 1901 basis of \$231,000.

Unlike many other similar "plants," the Portland mill is fireproof. Brick, iron and steel make up the walls; the floors are asphalt and concrete. The latter serves another economic purpose, as the dust which carries so much gold is easier collected.

The process of handling gold in a chlorination mill is familiar to all readers of this paper; the ore unloaded direct from the railroad track into bins with a storage capacity of 500 tons each, thence by gravity through a chute down to the grizzlies, the coarse rock passing on to great crushers that crack it, the mass being automatically lifted one floor and run through rollers that reduce the largest pieces to uniform size; thence (still automatically) through long iron barrels revolving horizontally, over a heat of 400° F., to drive off the moisture; thence to the screens, and then through a final set of crushers that make of it a flour-like powder; up by elevators to near the roof, there automatically sampled; then through another chute to the roasters—three circular furnaces, each 10 feet high, 60 feet diameter—through which rake the ralhles, keeping the roasting mass in constant motion for four hours in a heat from 900° to 1700° F.; then to the cooling hearth, where cold air quickly lowers the temperature of the incandescent dust, that, now no longer glowing, is again hoisted, weighed and dropped into twelve chlorination barrels, each holding 5000 gallons water, charged with chlorine gas under pressure, these barrels or tanks revolving for three hours, when the chloride of gold is changed by sulphuretted hydrogen to sulphide of gold, precipitated, passed through presses, melted, parted and made ready for the mint.

The G. E. Hose Couplings.

In the accompanying engravings is illustrated a new hose coupling which the manufacturers say embodies a number of improvements that will appeal to



all users of hose. The method of attaching the hose to the coupling by means of clamps has long been unsatisfactory to engineers, but this point seems to have been satisfactorily solved in the G. E. hose coupling, which holds the hose securely compressed in a metal pocket without the use of outside clamps. The G. E. hose coupling is the invention of E. A. Rix of San Francisco, and is being manufactured under his patents by the American Engineering Works, 204 Dearborn St., Chicago, Ill.

The G. E. couplings are suited for working under very heavy pressures. In the G. E. coupling the end of the hose is in a metal pocket and leakage is impossible. A noticeable feature is the increased size of the air passage, which is larger than is possible in old style couplings, where the hose is drawn over the corrugated end of the coupling.

The illustrations show the G. E. coupling in general view and in section. The coupling consists of four parts and is entirely self-contained, not requir-

ing the additional purchase of hose clamps nor involving the expense of their renewal.

The substantial proportions of the G. E. coupling and the absence of projecting bolts guarantees long life. The hose is firmly secured by the pressure of the tapered portion of Part 3, which is secured into Part 4 by means of the square socket at the larger end. There are several slight depressions in the walls of Part 4, into which the pliable hose imbeds itself, making it impossible to withdraw the hose until uncoupled. A rubber gasket is used between the faces of Parts 1 and 3, and in making connections with this coupling, Part 1 having a female end, may be attached directly to the pipe line without the expense of a pipe coupling.

A Butte Miner's Opinion.

W. F. Word, superintendent Gagnon mine, has returned to Butte, Mont., from New York. "I was particularly interested," said he, "in the excavation work that is going on for the great underground railroad, and, as a mining man, was not much impressed with their style of doing such work in the big metropolis. I believe that the contractors and superintendents of that big job could come to Butte and learn something of almost any practical mining man. It seems to me that they go about it in the most impractical and expensive way. I noticed particularly on one contract that instead of cutting down and getting a face on the work and then drilling horizontal holes for blasing, they were drilling vertical holes in the top of the rock. This scales off the rock, the blast being anything but effective, whereas a blast put in horizontally would throw down twice or three times the amount. Then there are so many men massed together that they are in each others' way. I believe the contractors are to receive something like \$35,000,000 for this work, and if they make a reasonable profit at this figure they might increase it if they did their mining according to the Butte method."

Improved Cathode Plate.

W. A. McCoy of Perth Amboy, N. J., has invented an improved cathode plate, illustrated herewith.

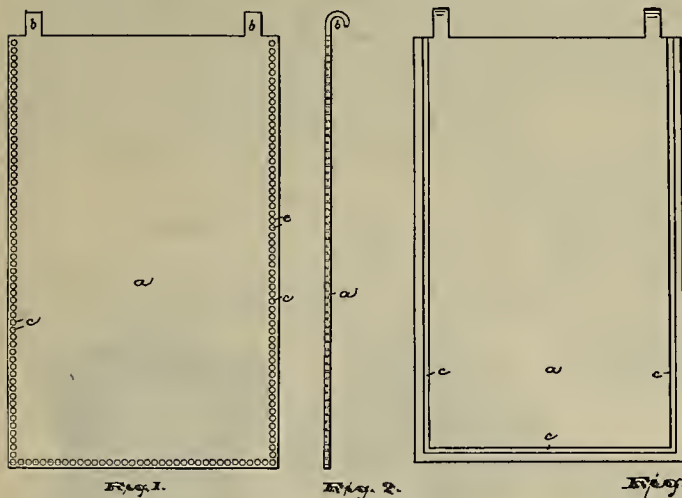


Fig. 1 is a front elevation of the improved plate. Fig. 2 is a side elevation of the same. Fig. 3 is a top-down view showing a modification of construction; a indicates a cathode plate, of copper or other suitable metal, having means such as the integral hooks b b at the top, by means of which the plate may be suspended to extend into the electrolyte. At or near the lateral edges and bottom of the plate a or other suitable position to facilitate stripping at opposite sides thereof are series of recesses formed in the face of the plate, forming receptacles for an insulating or electrically non-conductive material c c c. These recesses are preferably short drill holes separate and apart from one another, so that the insulating material c c will remain therein with security and not be detached under the rough treatment to which the more or less heavy plates are subjected when the same are handled. The perforations are close together, so that the exposed metal between them will form but slight connections of the deposited sheet with the metal deposited at the outside of the series of perforations; thus the deposited sheets may be easily stripped from the cathode plate, the sheet being easily torn or severed from the edge metal in the act of stripping. The edge deposited pieces may be removed from the cathode plate after stripping and be used as scrap metal or otherwise. The holes are usually drilled $\frac{1}{4}$ inch diameter and $\frac{3}{16}$ of an inch from center to center. The insulating compound may be of any insulating material, such as abietic acid anhydride and bitumen, grease, or other matter capable of withstanding the action of the electrolyte and the conditions under which the same is employed. The recesses at the sides and bottom of the plates may be continuous, as in Fig. 4.

The Mineral Crest, or the Hydrostatic Level Attained by the Ore-Depositing Solutions, in Certain Mining Districts of the Great Salt Lake Basin.*

W. P. JENNEY.

In the limestone area of Tintic and other mining districts of the Great Basin region of Utah it has been observed that surface outcrops of ore occur but seldom, and are mainly confined to points of relatively low elevation, where the veins cross some basin or ravine. Nowhere does a considerable body of ore outcrop on the tops or high up on the slopes of the hills.

Mining operations, on the other hand, have shown that large and continuous ore deposits frequently occur in depth in the limestone, beneath large masses of barren rock. Such ore bodies, when followed upward in the lodes, are found to terminate at well-defined levels, without reaching the surface. Yet the ore-bearing fissures themselves extend above the top of the ore, being often traceable, though barren of all valuable minerals, for hundreds of feet above the stopes in the mines, and even observable in outcrops at the surface.

This abrupt cessation of the ore at a uniform horizon does not appear to be connected with any change in the country rock adjacent to the lodes. The strata above and below this horizon seem to be in every way equally favorable to ore deposition. Explorations above it have developed an open-fissured country, not only of ore, but also of indications that mineral-bearing gold, silver, lead, or copper were ever deposited in the strata at that elevation.

The height reached by the ore, while usually constant throughout the length of a given lode, may vary in particular sections from the operation of local causes. Each lode in a district has its own distinct horizon, above which the ore deposits do not extend. Where the ore bodies are continuous for a long distance on the strike, and other conditions are uniform, the top or apex of the ore is nearly level or gently undulating; but more commonly its upper surface is broken into a series of peaks and pinnacles, alternating with flat summits and wave-like crests, reaching up from the main ore channel to practically the same relative altitude, and forming the ore crest or mineral crest of the lode.

Examination discloses in these mines many evidences that the terminal edge of the ore nearest to the surface represents, substantially, the height to which the mineral-depositing solutions ascended in the fissures during the period of ore formation—in other words, that the present ore crest is the high water mark, or ultimate level, reached as the result of the ascensional force of the heated ore-bearing waters.

In some instances lines of extinct mineral vents, nearly over the ore bodies, on the surface, mark the course of the lode. These are small local outcrops of quartz, chalcedony, siderite, ankerite, barite, and other gangue minerals, seldom carrying more than traces of the precious metals. It is not improbable that, during the period of ore deposition, these vents were geyser-like pipes or channels, extending from the ore deposits, hundreds of feet below, up through the non-mineralized strata to the surface, and constituting points of escape for steam and gases liberated by the chemical reactions incident to the formation of the ore. Surface explorations of some of them indicate that they were channels of up-flow for the waste waters expelled by the pressure of the steam and gases, after the deposition of the ores in the deeper strata. Among other evidence supporting this view is the occurrence in thick, handed sheets, lining crevices and open channels in these outcrops, of white, translucent chalcedony, a mineral deposited by hot silica-bearing waters.

To better understand these peculiar phenomena, it is necessary to consider the conditions attendant upon their formation. The earlier volcanic disturbances of the region are regarded as the direct cause of the elevation of the district and the up-turning of the sedimentary rocks, producing the numerous small mountain ranges and solitary island-like upheavals which illustrate the varied types of the Basin Range structure.

These earlier disturbances were followed by a long period of comparative rest, during which a wet climate prevailed and an extensive erosion of the exposed strata occurred, carving the surface of the district to its present contour. There were the same low mountain ranges, with spurs projecting like promontories into the sands of the desert, their steep slopes deep cut by narrow, rocky ravines, or scooped

out in basin-formed gulches. Later disturbances, deep-seated in the earth's crust, formed the vein fissures and induced the deposition of the ores at a time when the topography of many of these mining districts varied little from the present surface. The recent erosion, which has taken place since the deposition of the ores, has probably not removed, even on the more exposed slopes, more than 100 to 200 or 300 feet in depth of rock surface. This preservation of the ancient topography has been due, in great part, to the change in climate. In the present extremely dry period surface erosion is reduced to a minimum. So little are the outcrops of the ore bodies eroded that the conclusion seems inevitable that the present arid climate has prevailed continuously since their formation.

In such districts the outcrop, or intersection of the vein fissures with the old surface erosion, would be, in profile, an irregularly broken or serrated line, rising from the lowest points, where the fissures crossed some deep ravine or basin, to summits where the fissure helt cut through the tops of the hills or divides. Under these conditions the mineral solutions, forced upward in the fissures, found outlets of escape at places of relatively low elevation along their course, with a consequent reduction of head or hydrostatic pressure so great that, no matter how open the fissures, or how favorable the ground, no considerable deposits of ore could be formed above a certain level, depending upon the elevation of the outlets and the volume of the discharge, through them, of the heated waters, with the accompanying steam and gases.

Not only has the hydraulic head been controlled by outlets to the surface, but the escape of the solutions from the fissures into the walls and into the country rock adjacent, especially in mines in limestone, has also acted to some extent in the same way. The slow circulation of the mineral-depositing solutions through large caves or chambers, or through the interspaces in great masses of brecciated rock, from the extent of surface exposed and the free escape of steam and gases, has caused a reduction of both temperature and initial pressure.

During the long period of ore deposition fluctuations caused by any increase or diminution of pressure or of temperature in the ascending waters would naturally occur in the hydrostatic level. It must have been subjected to various accidents, such as the opening of new outlets at lower levels, or the choking or closing, by any cause, of outlets long in action. Moreover, the up-flow through the fissure would be modified by crustal movements opening or closing its channels, and thus affecting both its volume and its pressure. Many other factors—for instance, the specific gravity of the solutions and the proportion of steam and gases mixed with them—must have had their effect.

The mixture of a liquid with gas reduces the weight of a given column, and when this column is under a hydraulic head not thus affected this reduction of weight is equivalent to an increase of pressure in augmenting its flow. Friction produces a loss of effective head, which rapidly increases in contracted or tortuous channels, and must become very great where the solutions spread out and traverse the interspaces of fractured or brecciated rocks.

Since the completion of the primary ore deposition oxidation and re-formation of the minerals have tended to move the ore crest downward in the fissures, but the quartz and other gangue minerals remain, together with oxidized ores in such quantity that there is usually little difficulty in determining the original crest level.

In most mining regions erosion has been so great since the period of mineral deposition closed that many hundreds and often thousands of feet of strata have been removed, destroying all record of what occurred in the upper part of the veins. So far as observed by the writer, mineral crests such as have been described above occur only in those districts in the Basin region where, at the time the ores were deposited, the surface was deeply cut by erosion, and the later climatic conditions have been such as to preserve the old surface with little alteration—a combination of conditions which might be regarded as exceptional.

Now that attention has been drawn to this subject, it is not improbable that like occurrences will be found in other mining regions of the world, and we may certainly look for the discoveries of similar deep-seated ore crests not formed and determined chiefly, or at all, by the position of surface outlets, but due to the inadequacy of the initial pressure of the heated waters to force them to the surface—a condition comparable to that of many artesian basins, where flowing wells do not exist, because the hydrostatic level is underground.

The observations of the writer indicate that ore crests are not confined to veins or lodes of replacement in limestone, but may occur in fissure veins in quartzite, and in lodes traversing eruptive granitic rocks.

On typical free milling gold ores of grade from \$4 to \$7 the saving on the plates and in concentrates will be from 80% to 94%. The percentage of saving is checked by assay of the final tailings. The mine run assay is not based on as uniform sampling as the tailing assay and cannot as safely be used to estimate percentages from.

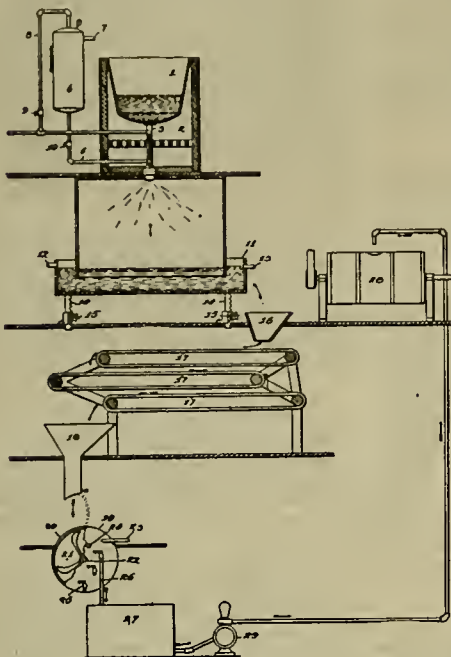
*Trans. Am. Inst. Min. Eng.

Mining and Metallurgical Patents.

Patents Issued November 11, 1902.

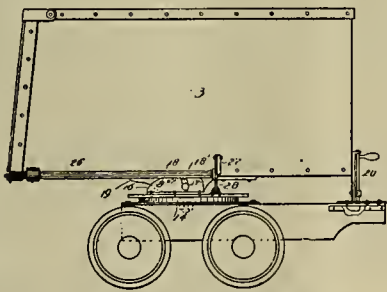
Specially Reported and Illustrated for the MINING AND SCIENTIFIC PRESS.

PROCESS OF MAKING WHITE LEAD.—No. 713,155; W. H. Rowley, St. Louis, Mo.



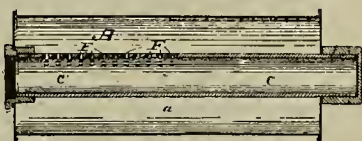
In manufacture of white lead, conversion of general mass of metallic lead and suboxide of lead to uniform protoxide of lead, by constant agitation while in paste condition and in contact with free air; building up gradually general mass to protoxide of lead, as protoxide is formed (as a pellicle on particles of lead) removing it by attrition caused through agitation, thus continually presenting new surfaces for oxidation; working lead mass in heavy paste form bringing particles of lead in close contact with one another during agitation, to keep mass in general condition of metallic lead and protoxide of lead void of higher oxides, as suboxide of lead formed is rapidly converted into protoxide of lead, allowing particles of lead in mass an opportunity to form high oxides; working lead mass by agitation in this condition until gradually fixed protoxide of lead is formed; then subjecting mass to more severe treatment of oxidation by forcing air into mass in agitation in drum supplied with door at top, open under milder treatment of free air, but closed when air is forced into same; finally washing out and carbonating protoxide of lead.

ORE CAR.—No. 713,321; W. C. Matteson, Stockton, Cal.



Combination in ore car, of truck frame, car body pivotally supported thereon, door having hinges at top pivoted to rear of car body, rolling catches adapted to engage lower portion of door, door hinges consisting of metal straps extending from top to bottom of door, each having backwardly projecting hinge lug or extension embracing pivot on car body, lower ends of straps serving as chafing plates for catches.

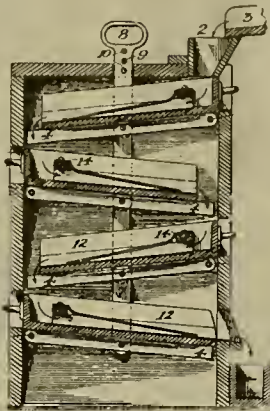
EXHAUST PIPE MUFFLER FOR GAS OR OTHER ENGINES.—No. 713,536; J. L. and C. J. Tobias, Chicago, Ill.



In muffler for gas and other engines combination of shell provided with series of small apertures grouped on one side cylindrical wall thereof extending from one end toward other end, bushing on one end wall of shell, provided with shoulder abutting against end wall, pipe secured in hushing, extending through

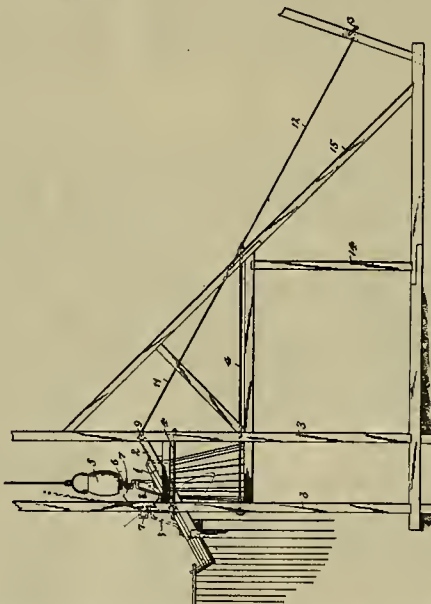
other end of shell, cap closing pipe, pipe and cap provided with corresponding screwthreads to force end of cap against end of shell adjacent thereto, pipe provided with series of small apertures grouped on one side thereof extending from near one end thereof.

GOLD SEPARATOR.—No. 713,105; F. M. Johnson, San Francisco, Cal.



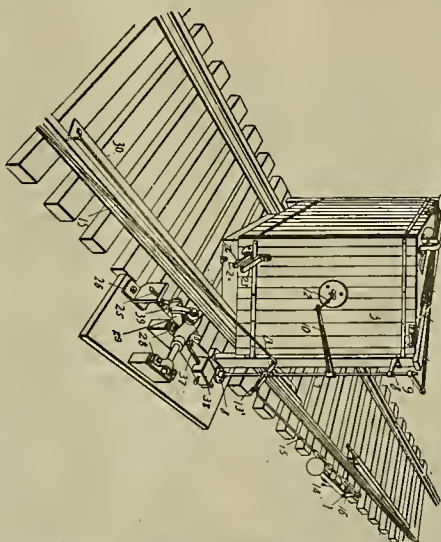
Combination of casing, plurality of arms pivoted to each side thereof, arms of each side pivoted alternately at opposite ends, vertical adjusting bar arranged centrally on each side connected to all arms on its respective side, and midway of length of arms; removable trays inserted through openings in casing supported on arms, each tray having gold-retaining bottom surface, and cross bar near its initial end with flexible apron connected to cross bar.

DUMPING DEVICE.—No. 713,220; C. W. Howbert, Cripple Creek, Colo.



Dumping device, bucket, swiveled ring connected to bottom of same, sliding door carrying hook adapted when operated to automatically engage swiveled ring, close shaft, and direct dumped material from shaft.

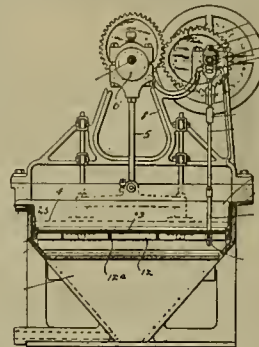
MINE TRAP DOOR.—No. 713,181; J. Wack, Canton, Ohio.



Combination of self-closing mine trapdoor; of actuating bar arranged adjacent to one rail of track operatively connected to door for opening same,

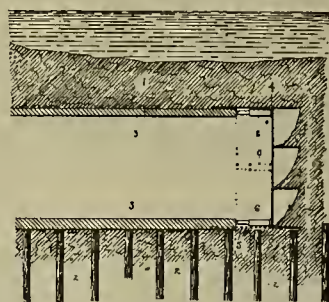
catch, latch carried by door adapted to engage catch and hold door in open position, second actuating bar arranged in close relation to track rail, releasing means operatively connected to last named actuating bar for releasing latch from engagement after car has passed through door opening, latch and catch holding door open against tension of self-closing means, whereby when latch is released, door is allowed to close automatically.

JIG FOR ORE WASHING.—No. 713 436; C J Hodge, Houghton, Mich.



Jig for mineral or ore washing, comprising in combination tank, one end wall of which is lower than other walls pivoted with outwardly projecting lip, screen frame supported in tank, means for vibrating screen frame, one end wall of which screen frame is in plane below other walls, but in plane above lower end wall of tank, provided with overflow lip projecting from tank lip in plane differing therefrom in pitch, whereby clearance is provided for oscillation of screen frame end walls, screen and screen supporting frame, contents of screen frame prevented from overflowing sides.

METHOD OF CONSTRUCTING TUNNELS.—No 713 520; C. SooySmith, New York.



Method of constructing tunnel consists in placing plurality of piles in line of proposed structure, at such depth that their heads shall be on substantially same level as bottom of proposed structure; advancing shield through surrounding material in close proximity to and over piles; constructing tunnel upon piles.

A Georgia Stamp Mill.

Of some historical interest is an account of "Gold Mining in McDuffie County, Georgia," by W. H. Fluker of Tatham, Ga., at the recent meeting of the American Institute of Mining Engineers.

McDuffie county is crossed by the Georgia gold belt, which is about 2 miles wide and contains quartz veins carrying gold ore shoots which were first prospected in 1826.

"In 1833," says the writer, "J. Griffin purchased the rights of his associates, who had up to this time confined their work to placer mining on a small scale. He erected a stamp mill, the old mortars of which can now be seen near the point on Little river where the mill was first used in 1833. They were rectangular in shape, 10 inches wide by 14 inches deep and 30 inches long. The stamps, of which there were three, consisted each of a square cast-iron shoe with a square, tapering neck about 8 inches long. The neck was driven into a hole mortised into the end of a wooden stem 6 inches square and 7 feet long, around which was placed a heavy iron band to prevent splitting. The cam shaft was a solid piece of wood 26 inches in diameter with blocks which served as cams mortised into it. These, in revolving, came in contact with other blocks serving as tappets, which were fastened to the wooden stem by means of iron bands and wooden pegs or dowel pins. The mill was driven by an undershot water wheel, the shaft of which was a continuation of the cam shaft. The mortars described above were soon replaced by wooden mortars provided with a discharge and screen, similar to those used at the present time, and having a single cast-iron die extending the length of the mortar. With such a mill, which was probably the first stamp mill erected in America, Jeremiah Griffin, in the year 1837, cleared \$80,000. The ore that was milled was nearly all taken from what is now called the Columbia vein on 'the forty-acre lot,' a vein that is still profitably worked."

Mining Summary.

Specially compiled and reported for the
MINING AND SCIENTIFIC PRESS.

ALASKA.

The cleanup of the Alaska-Juneau mine for the last season was satisfactory. Foreman Barrett is facing the Juneau tunnel to connect the channel with the Alaska-Juneau property. Accommodations will be constructed for the men near the mouth of the tunnel.

ARIZONA.

COCHISE COUNTY.

The Calumet & Arizona smelter, at Douglas, is in operation.

Near Bisbee the two-compartment shaft on the Copper Glance M. Co.'s property is down 452 feet. It will be sunk to a depth of 1000 feet. The company is also sinking a shaft—No. 4—on the south side of the claims. This has reached a depth of 110 feet.

GILA COUNTY.

Furnace No. 2 at the Old Dominion smelter was blown in last week; two furnaces are now in operation. It is locally estimated that the monthly output will be 1,500,000 pounds. Men are being put on every day, and it is expected there will be 600 on the payroll.

GRAHAM COUNTY.

C. P. Rosecrans, manager Standard Copper mines, tells the Era that from January 1, 1902, up to and including October 24, 875.39 tons of copper ore had been shipped, for which net returns had been received amounting to \$18,397.34. The ore made a general average of 24.39%. The company will build ore bins on the line of the Coronado railroad, about three-quarters of a mile from the mines, to which the ore is carried by burros. The company will erect an incline tramway from the mines to the ore bins.

MARICOPA COUNTY.

Near Wickenburg, the Electra M. & M. Co. has an ore body 3 feet wide at the 210-foot station. An electric hoist is contemplated.

The Phoenix & Eastern road, from Phoenix to Benson, within sixty days will be in operation from Tempe to Mayer, 14 miles. The total length of the projected road is 185 miles; it penetrates a low grade ore district.

MOHAVE COUNTY.

The Chloride smelter has started up.

PIMA COUNTY.

Supt. Brownell of the Producer M. & S. Co. has twenty men at work on the company's property and is putting up large buildings at the camp.

PINAL COUNTY.

The Paraffine Co. has oil near Florence at a depth of 600 feet, the first oil found in that territory.

YAVAPAI COUNTY.

C. W. Platt, superintendent the Illizona M. Co., has begun work on the properties in Kirkland mining district.

Jerome sends word that the United Verde mine will resume this week, after a compulsory shutdown of four months.

CALIFORNIA.

AMADOR COUNTY.

The Del Monte superintendent reports that in September a crosscut tunnel was run 50 feet, at a cost of \$12.18 per foot; in October, 52 feet, \$10.70 per foot; upraise run, 79 feet, \$5.15 per foot; tunnel run, 125 feet, \$1.40 per foot; average width of ledge, 18 inches. Stamps are dropping under the supervision of B. C. O'Neill.

F. R. Culbertson is back from Washington. He says: "We have a long term lease on the Wildman & Mahoney and we are developing it carefully to see what it is worth before deciding on whether we shall take up the bond. We are down 1400 feet, and the ledge there is from 30 to 40 feet wide. There are upwards of 1,000,000 tons in sight. Much of it is of low grade, but it can be mined, hoisted and milled for \$1.75 a ton, so that the average needs not be high to pay. Upwards of \$5,000,000 was taken out of the mine in the old days, with an average of from \$6 to \$8 ore. The property has on it eighty stamps, and we have been working thirty of them. If we decide to take over the mine we shall equip it with a total capacity of 200 stamps, which will handle 1000 tons of ore a day. The ore there can be milled for 25 cents a ton."

The Gwin Mine Development Co. has declared dividend No. 39 of 10 cents per share, making a total for 1902 of \$140,000 and a grand total of \$411,500.

BUTTE COUNTY.

The Golden State Power Co. has incorporated in San Francisco to furnish electric light and power; H. P. Hussey, presi-

dent; H. F. Lange, assistant secretary and treasurer. The company proposes to use the North Fork of the Feather river from Big Bend to Big Meadows. The hydraulic project contemplates a plant of 40,000 H. P.

CALAVERAS COUNTY.

The Black Cat M. Co. is organized, W. T. Robinson superintendent. The property is the northern extension of the Esperanza mine.

Superintendent P. L. Shuman has resumed work on the Lancell gravel mine, near Buckeye.

Kavanaugh & Lewis of the Western Mines Co. are developing the Foote & Thompson mine at Rich gulch.

W. J. Nelson will open extensive gravel ground at Calaveritas. The present ditch will be enlarged to a width of 5 feet on the bottom.

The Utica mill has resumed. Plenty of water is assured for continuous operations.

DEL NORTE COUNTY.

At Gold Beach, where Rogue river empties into the Pacific ocean, a deposit of sand has accumulated, covering hundreds of acres and ranging in depth from 10 to 30 feet. Rogue river passes through a country of gold and copper ledges, and in its flow to the ocean it has been wearing away the gold-laden rock and carrying it in tiny flakes to where it meets the waves of the Pacific ocean, and there deposits the sands and gold. A storm arises on the ocean, the waves beat along the shores and the gray sand is washed away and the deposits of black sand are left. By laborious methods these have been worked, and the returns to the man have varied from \$3 to \$100 per day. When one spot has been uncovered by the ocean and the gold taken out, another storm will uncover as rich a spot somewhere else, and another find is made. No one has a monopoly of these deposits of black sand, for they are found along the beach for miles, and all the miner does is to watch for the action of the waves to take away the gray and expose the heavy black sands, carrying gold.

EL DORADO COUNTY.

Some time ago the Montauk M. Co., former owners of the Zentgraf mine, in insolvency, transferred the mine to W. D. Goodwin, one of the stockholders, to satisfy a debt of \$55,000. Other creditors are now seeking to have this transfer set aside, and the case is on trial.

The Levitt Con. M. Co. has been incorporated in Los Angeles to develop the Levitt group of quartz mines near Kelsey.

INYO COUNTY.

W. G. Nebeker, who has returned to Salt Lake, Utah, tells the Tribune that the owners of an Inyo county group, for which the Hearst estate was paid \$25,000 a short time ago, have rejected a bid of \$350,000 for it.

KERN COUNTY.

The Standard Co. has begun building three earth reservoirs for oil storage, capacity 75,000 barrels each. The Standard's storage facilities in that district are estimated to be 128,562,500 gallons.

At Bakersfield the Pacific Smelting Co. has incorporated "to own and operate mines, smelters, railroads and other properties." A. W. Macrae, B. L. Brundage, A. Well, H. P. Bender, G. W. Lupton, J. W. Scott, C. L. Cladn, G. T. Nighbert, C. Bickerdike, C. W. Wickersham, all of Bakersfield. They say they will have a smelter of 100 tons daily capacity. Oil is to be used as fuel.

MONO COUNTY.

The Sweetwater M. Co. will run a 200-foot drift and put in a concentrator and slimes plant next spring.

NEVADA COUNTY.

The W. Y. O. D. mine is being unwatered.

The hoisting works at the Conlin mine are completed; a large mill may be erected on the property to take the place of the one recently destroyed by fire.

The California Electric Co. will enter Grass Valley with power from Alta, where it has works.

PLACER COUNTY.

A drain tunnel is being run at the Boulder. After the mine is unwatered a five-drill compressor will be put in. The Eureka is producing. A sale to the Hathaway Co. is reported likely. The Eclipse is now down to the 500-foot level. Peters & McLaughlin have the Lizard property at Bald Hill and will work it this winter. Manager Manson is unwatering the Calf Pasture mine at Rock creek.

SAN BERNARDINO COUNTY.

At Dale the O. K. has been sold. Men go to work on it next week. The Brooklyn mine has run continually all summer. The cyanide plant is in full operation.

W. A. Clark of the San Pedro, Los Angeles & Salt Lake Railroad says the road will at once be built from Barstow to the north and the south over the desert. Four thousand tons of steel rails have

been laid down at Barstow for about 20 miles of track. This was the original plan. Barstow is where the survey of the San Pedro crosses the Santa Fe. This settles the route through Nevada also, as the San Pedro, by crossing at Barstow, will adopt the old original route in Lincoln county, and after crossing at this point can reach Cajon pass.

SAN DIEGO COUNTY.

The California King G. M. Co., Picacho, has filed five additional placer claims along the Colorado.

SANTA CLARA COUNTY.

Near the New Almaden, 12 miles from San Jose, the Ella Copper M. & D. Co. are reported to have a ledge of 10% copper.

SEASTA COUNTY.

The Huron Submarine Gold Mining & Construction Co. is dredging in the Sacramento river, above Redding.

The Millville Tidings alleges that Clover creek cinnabar mine samples assay 27.5% quicksilver.

SISKIYOU COUNTY.

The Journal says that A. C. Brokaw of the Quartz Valley hydraulic mine has started with his giants and hydraulic elevators, since the late rains. The hydraulic mines at Oro Fino are also starting.

The Blue Ledge mine is reported bonded to W. S. Haskins, formerly of Rossland, B. C., who represents Eastern men. The mine is 2 miles from the Oregon line and 35 miles southeast of Jacksonville. Fourteen claims comprise the group. There is a ledge of copper-bearing ore.

Near Etna, J. W. Harris proposes a mill on his ledge. Work is to be resumed on the Quartz Hill mine at Scott River, with ultimate intention of a mill.

STANISLAUS COUNTY.

The Standard has laid off work on the long pipe line, the present terminus being at Newman, 110 miles from Point Richmond, it is supposed, because of failure of material to arrive. Since its inception, the line has been close up to the shipments. Men are still putting in pumping plants and building the stations.

TRINITY COUNTY.

Coffee creek is again attracting attention. Weatherby and Drennan have claims on Coffee creek, near the Yellow Rose, and are taking out an average of \$8 a day to the man by hand mortar.

The new mill on the Chloride-Bailey group, near Weaver, owned by the Trinity County G. M. Co., is working successfully. It has twenty stamps and the old mill ten stamps. They are getting seventy-five tons a day through the plants. They have a cyanide plant at work on 20,000 tons of tailings at one dump, and are taking ore from a shoot 4 feet wide and 500 feet long, operating 700 feet deep. The ore runs from \$14 to \$15. Of that they catch about \$10 on the plates and get \$2 in the concentrates, while the tailings carry a little more than \$2. They are cyaniding the tailings at a cost of about 75 cents a ton and are saving about 90% of the values. They have seventy-five men at work there.

The Jenny Lind & Maple M. Co. has a promising property near the Chloride-Bailey. The showing is considered good enough to warrant the erection of a 20-stamp mill next season. The Chloride-Bailey is an old mine, which had been formerly operated. The Jenny Lind & Maple is virgin ground.

The Texas Jack mine, Indian creek, is reported sold for \$21,000 to W. & M. Collins. Two miles from the Texas Jack is the Oriole mine, worked and owned by Collins Bros., who, before buying the Indian Jack, bonded their Oriole property to Washington men for \$25,000.

TUOLUMNE COUNTY.

(Special Correspondence).—At the Republican mine the enlargement of the mill is about completed. There is enough water to run the compressor. The Crystalline mine, near Jamestown, is employing thirty men. Manager A. C. Morison is crushing ore and will keep his 10-stamp mill in operation with ore from the 600-foot level. A telephone is in at the Sell mine, which from the 300 level tunnel has been stooped out to the surface. A shaft is being sunk to strike a crossing at the 400 level.

At the Horseshoe Bend mine two crosscuts are being run to tap the two veins intersecting the property. Geo. Morice is in charge. A new plant has been installed at the Sonora chlorination works for roasting ores. A new patented process is to be employed, the main features of which are fine pulverizing, quick roasting on a hearth inaccessible to the flames of the furnace, and a subsequent amalgamation by prepared quicksilver.

Superintendent Parrish of the Spring Gulch mine reports a vein of ore on the hanging wall crosscut on the 300-foot level, and ore in drifting under the old workings at the 200 level.

Sonora, Nov. 17.

The main shaft at the Mazeppa mine is down 830 feet.

Superintendent Trittenbach expects to start work on the Dreismann mine Dec. 1st with twenty-five men. Sinking from the 400 foot level will be started.

The Magnet hears that the Big Casino M. Co. has the Mack mine at Big Oak Flat and will put miners at work.

In the Bell mine, Tuttle town, on the 400 level, drifts are being run on the vein north and south, ore showing across the face of both. A crosscut run shows the width of the ore body to be 30 feet.

At the Ohio mine an air compressor is in. Power drills will be used. The Crystalline mine will start November 24th. Thirty stamps will soon be dropping in the Harvard mill. At the Jumper mine there will be an increase in the force.

S. E. Rigg has charge of the McAlpine mine. A hoist 35 feet high is completed.

YUBA COUNTY.

Superintendent P. H. Thornton of the construction work of barrier No. 1 on the Yuba, near Daguerre Point, says he has eighty men and several teams at work. The rock ledge has been uncovered; work of taking out the rock for use in the barrier is under way.

COLORADO.

ARAPAHOE COUNTY.

At Denver, D. Guggenheim says: "We have now enough smelters. What we want are mines. We are after them, regardless of location, providing they are what we want and reasonable terms can be made."

BOULDER COUNTY.

Near Eldora, the Revenge Dev. Co. have men pushing their tunnel on Bryan mountain. Superintendent Hutchins says the tunnel will be 8x8 feet in the clear, double track and water channel. First 50 feet are to be timbered with 10x10-inch sawed timbers.

CLEAR CREEK COUNTY.

(Special Correspondence).—The Idaho Springs M. & R. Co. is having Bonnie & Lee prepare plans for the overhauling of their old mill. They will put in crushing and concentrating machinery and make the same an up-to-date mill for treating their grade of ore. A 200 H. P. steam plant is being put in. Idaho Springs, Nov. 14.

Near Idaho Springs, Manager Morgan has a new plant of machinery for the Arizona mine. Sinking of the shaft is to be resumed to a depth of 1000 feet.—The Roberts mill is putting in a new flume 2000 feet in length along Clear creek, and will have an additional 100 H. P. as auxiliary to the Chicago creek power, the mill being located at the junction of both streams.

The work of extension of the Colorado & Southern Railroad from Silver Plume to the Terrible mine is completed. The mill is being finished and the flume from the dam is completed.

The Georgetown Courier says the Elkins Co. is advancing construction work at the Terrible mine. When the engine is in place, the mine will be pumped out and active mining begun, together with erection of the new mill.

Idaho Springs says J. G. Roberts has found the lode within 1000 feet of the spot where Jackson made his find which created so much excitement in 1859. The lode was found by accident, it lies at the upper part of the old Jackson placer, on Chicago creek, and courses from northwest to southeast. A hole has been sunk on it for 10 feet, opening into about 6 feet of free-gold quartz. More than forty-three years ago Jackson made the first discovery of placer gold at a point near the mouth of Chicago creek. The gravel produced \$500,000 worth of gold, but the vein from whence it came was not found. Lodes were frequently encountered in that section, yet the one with its free gold remained a mystery. The placer miners found quartz carrying free gold in the placer, an indication that the lode was not far away. Men prospected for miles along Clear creek and in several cases were successful in opening up pay bodies of mineral, notably the Quito, about 1 mile beyond. But the lode which produced the free gold was never found till a few days ago. The vein is free milling and flakes of free gold are found throughout the lode. The foot wall is well defined, almost like slickenside. Through the placer ground it was covered very deep by slide and had never been located, although what was known as the "big vein" had been prospected within 30 feet of it for many years without much success. The vein is 20 feet wide and carries about \$4 in gold to the ton, belonging to the owners of the Central tunnel.

CUSTER COUNTY.

A test run of ore from the Bull-Domingo mine shows a saving of 98%. The properties of the Valley M. Co. are

being advertised for sale by the sheriff. The management of the Bassick mine is shipping concentrates.

FREMONT COUNTY.

Near Florence, the Frazer Oil & Dev. Co. has drilled into a seventy-five barrel oil well at a depth of 1660 feet.

GILPIN COUNTY.

The Specie Payment mine on Bellevue mountain is making shipments to the Hidden Treasure mill at Black Hawk and the returns are said to average close to three ounces gold per cord. The monthly production of the property is usually about 100 tons, the first-class ore going \$100 and better. The company is making shipments also to the Golden smelter of a still lower class of smelting ore. E. W. Williams is manager.

Machinery has been taken from the Lotus shaft and installed on the Peck shaft of that group. Sinking has begun. Sternberger Bros. intend to make this the main working shaft on the east end of their holdings and will sink several hundred feet.

A survey is being made from Yankee Hill for a narrow gauge railroad to be built from Central City to Yankee and Alice; estimated cost \$250,000. J. Wilson, Des Moines, Iowa, is chief engineer. The new railroad will be between 12 and 15 miles in length, which will be decided on as soon as the surveys can be made determining its exact course. Those in charge of the surveying work say that the new road may be built from Central City around by Russell Gulch.

At Central City is incorporated the New Epoch G. M. & L. Co., B. Ross, Z. T. Brown, E. S. Alnutt, T. J. Ballantine, to operate in Gilpin and Teller counties, main office in Denver. They have a lease on the New Century lode, in Eureka district.

By tramway from the mines on Quartz hill operated by the Kansas-Burroughs Consolidated Co., for the month of October was shipped 254 cars, which, with fifty tons from the University-Kansas, made 260 cars, 2210 tons.

The Pearce mine, on Nevada street, will be reopened. E. H. Messiter, manager.

E. S. Moulton, manager the Rocky Mountain mill at Black Hawk, has a lease and bond on the Corydon and Adaline properties.

Near Central City, Supt. Ballantyne of the Ingalls G. M. & L. Co. has a group of claims on Gunnell hill. Bodies of low-grade ore are exposed and values are improving.

A strike is reported in the Saratoga mine; at the depth of 1000 feet a body of ore 28 feet wide.

HINSDALE COUNTY.

Near Lake City the working shaft at the Ute & Ulay mine, Henson creek, now down 140 feet, will be continued until the Ute vein is cut at an estimated depth of 550 feet. Should the ore bodies then warrant it, the company will erect a concentrating plant and the shaft continued a further distance of 650 feet to the 1200-foot mark, where the Ulay vein would be intersected.

The new mills at the Henson Creek Lead Mines Co. and the Red Rover Co. properties are ready to grind.

Superintendent Farrell has the concentrating mill at the Red Rover mine finished and is crushing ore for the Lillie mine. At a distance of 1175 feet the vein is cut, showing a body of ore. Drifting was carried on 500 feet, an upraise made to the upper workings, and at every 125 feet levels run on the vein.

LAKE COUNTY.

Manager McDonald of the Arkansas valley plant, Leadville, says the company will receive at its Denver and Pueblo plants as much low-grade iron as the district can produce and will temporarily waive its treatment charge on all such iron ore carrying up to five ounces in silver, 40% excess basis, with the understanding that when ore received on this basis nets the mine over \$3 any excess over \$3 and up to \$3.50 will be absorbed by the smelting company. The regular schedule on all oxidized iron up to five ounces silver has been 50 cents per ton. The Post shows that if ore carries four ounces silver and 5% excess iron the metal contents will be worth \$2 and the iron 75 cents, or \$2.75. Heretofore this would pay a treatment charge of 50 cents, thus leaving such a narrow margin that the ore could not be mined. The present arrangement permits all such iron being shipped without exaction of any treatment, so that the mines only need figure on mining and hauling. If the value of the ore reached \$3.25 the 25 cents would be absorbed by the smelter, and if \$3.50 then 50 cents would be taken, while if it reached above \$3.50 on ores running not more than five ounces, 50 cents would still be deducted. This rate applies only to low-grade ores. The higher grades of iron are not there-

fore affected, the whole intention of the waiver of the treatment charge on material running up to five ounces silver being to move a tonnage which heretofore it has been unprofitable to mine. The new arrangement takes in every mine in the district.

The New Leadville Home M. Co. will mortgage the property to raise funds to wipe out the indebtedness and carry on future work. It was shown that from March to October of this year the Home Co. has shipped 33,682 tons of ore, from which it received from the smelters \$90,500. The average value of all ore mined was \$2.69, from which, after paying expenses, the company had nothing left and was running in debt. The indebtedness on Oct. 4 amounted to \$7180.

OURAY COUNTY.

At Ouray, the Home pyritic smelter, A. P. Wyman, A. A. Shifter, H. L. Crain, A. J. and W. Desmond, has been reorganized. The plant was consumed by fire eighteen months ago, after which it was rebuilt. The site is at Bachelor switch, on the line of the Denver & Rio Grande, 2 miles north of Ouray; capacity, 150 tons per day.

Judge Stevens has decided a question of importance to local mining men and of interest to mining men generally. In the action of the Treasury T. M. & R. Co. against the owners of the Corn Cob lode, the court held that under the laws of the State the company had the right to condemn a right of way across the Corn Cob lode under the eminent domain act. This assures the further prosecution of the tunnel and gives hope for other like undertakings that have been delayed by owners who would not consent to their property being crossed by a tunnel.

PITKIN COUNTY.

Men at the Gold Cup mine are at work in the ninth level. Pearson & Eckbert have a lease on the Dunraven property. A tunnel for the Taylor Park road will run on the pass between St. Elmo and Tin Cup. The Colorado S. & M. Co. will extend the North Halls Gulch tunnel 700 feet more. Air drills will be used.

SAGUACHE COUNTY.

(Special Correspondence).—The Colorado Mines Consolidated Co. of Colorado Springs has completed a 50-ton concentrating mill on its property at Cochetopa. Tests show that nearly all values can be extracted. They have 5000 tons of ore on the dump. The tunnel is in 1000 feet. A winze is being sunk. The values increase with depth. The company have twelve claims. They are also doing considerable work on their property at Whitehorn and have made connection with the shaft through the tunnel. A large body of hard carbonate with black manganese is exposed. C. F. Rickey is president, J. McConaghy general manager.

Whitehorn, Nov. 14.

Near Bonanza, J. D. Baldwin of the Rawley M. & M. Co. will have forty men at work.—The Juretta, under the management of J. E. Ashley, is running a crosscut.—Superintendent D. I. White-man at the Eagle mine is down 300 feet and working in manganese ore.—Superintendent Wm. Raworth of the Little Sister G. M. Co. will develop the group by a long tunnel, which will give a total depth of 1200 feet and open up bodies of ore.

SAN JUAN COUNTY.

(Special Correspondence).—The Sloux M. Co., at Eureka, will work by contract this winter, by tunnels, the Toltec, 200 feet long, and the Mogul, 500 feet long. Manager E. C. Condit will erect a new mill.

Eureka, Nov. 15.

O. Mears is reported to project consolidation of many of the mining interests of Red Mountain section and the connecting of Silverton and Lake City by railroad. This would mean the running of the long tunnel from below the Meldrum tunnel, to cut the higher mines about 1400 feet deep.

Manager Lacy will operate the Emma mine in Ice Lake basin all winter.

The Revenue at Ouray has finished its tunnel to the Telluride side, 4000 feet. Ore was struck near the apex.

E. H. J. Amy, in the Governor, South Lookout mountain, has the tunnel in 1000 feet.

Supt. Umbel of the Henrietta mine says that the breast of No. 1 level is in ore 11 feet wide, No. 2 in ore 9 feet wide, and No. 3 in ore 18 feet wide. It is not necessary to drive them any farther until after a mill is in operation, as the ore taken out in development work has to be thrown on the dump when it should be run over the tram into the mill or to the railroad cars for the smelter.

B. Mattiotti, foreman Japan mines, is driving a crosscut tunnel on that property, 8 feet high, 7 feet wide, a 2-foot ditch at the bottom and side of tunnel, objective point Japan vein, distance of 2700 feet from its mouth. With machine

drills propelled by air he has averaged 10 feet a day, and is now in 1550 feet, with 1150 more to drive to cut the Japan vein 850 feet below the surface and 640 feet below the point where the upper crosscut tunnel intersects the lead.

The mill and tram line of Silver Ledge M. & M. Co. at Chattanooga is in operation. The company expects to maintain a daily production of 100 tons ore.

G. W. Crawford has bought the Yankee Girl, the Vanderbilt, the Guston, the National Belle, the Charter Oak and the Hudson, and has organized a company to operate them. It is understood that he has also bought the railroad running from Silverton to Red Mountain. The Monmouth tunnel, planned to go through Red mountain, will cut these properties. The tunnel begins on the eastern side of Red mountain and will be 2 miles long. At the center of the mountain it will be 3000 feet below the surface. Before reaching the properties it will cut through the Henrietta group, owned by Kendrick & Gelder, the Congress, the Oliver and the Monmouth properties.

T. Clarke is putting in a 250-light plant at the Highland Mary.

SAN MIGUEL COUNTY.

Manager Jno. Herron of the Tomboy properties, in a report made Oct. 20, shows an output for the fiscal year ending June 30 of 85,726 tons ore; average value, \$9.98 per ton; gross yield, \$856,064.50; to mine and mill this ore cost \$505,747.67; average \$5.85 per ton, giving average profit \$4.13 per ton; aggregate net profit for year ending June 30, \$354,310.83. The new 60-stamp mill cost \$150,000, of which \$70,000 is included in last year's expense account. The crushing department of the mill was started October 20, and on the 3rd inst. the whole plant was in operation, and is now daily reducing 250 tons. Manager Herron says: "During the year the Tomboy proper produced 48,644 tons of ore, which yielded \$329,232.18, an average of \$6.77 per ton, at an expense of \$257,958.31, a profit of \$71,263.87."

The two Smuggler-Union mills at Pandora, 1 mile above Telluride, have a daily combined capacity of 400 tons. The mills are supplied principally from the Smuggler-Union mines, though the Contention mine, in Bear creek, connected with one of the mills by an aerial bucket tramway 2 miles in length, has been furnishing sixty tons ore daily. This property has been supervised by F. K. Borrow of London, who last week resigned to go to South Africa to take the management of a mining property there. The Smuggler Co. bought that property years ago for a consideration of \$125,000, and has kept thirty men employed in development. In addition to the Smuggler vein the company owns the Pennsylvania lead, which crosses it at an angle of 15°, and on which a tunnel has been driven 3000 feet; from its mouth the new tramway runs to the mills.

SUMMIT COUNTY.

Manager Griffith will resume work for the Augusta M. & M. Co. on the Juventa property at Lincoln.

In the Wiltch's Head mine, at Montezuma, Russell & Stewart have a 2-foot vein of 800-ounce silver ore.

TELLER COUNTY.

D. Hanley, manager Cripple Creek Enterprise M. Co., expects to catch the Abe Lincoln vein of the Stratton estate.

At Cripple Creek, in the civil suit of the Rio Grande Sampler vs. Stumpf & Myers, resulted in a verdict for the Rio Grande sampler for the amount sued for, \$1292. It was alleged by the Rio Grande and Eagle samplers that Stumpf & Myers and Kelley had salted ore shipped from their lease on the Gold Sovereign, and that the samplers named were out several thousand dollars each. The Rio Grande sampler attached money deposited by Stumpf & Myers in the bank, thus the civil action that has been decided in favor of the sampling company.

The Victorator, Anaconda and Rebekah mines, Cripple Creek district, have signed contracts to ship their product to the United States and Standard Reduction companies' mills for four years, beginning Jan. 1, 1903. The aggregate tonnage from these mines is about 4500 tons per month. Manager MacNeill says the company is now considering plans for the erection of a \$100,000 electrolytic plant at Colorado City. The new plant will assay the manufacture of chlorine gas by electricity, the process to be used in conjunction with the two large chlorination mills now in Colorado City.

The Golden Cycle property shows production of 125 tons of ore per day running \$20 per ton.

Five feet of 2-ounce ore is reported on the Tom Bigbee, on Squaw mountain.

Work on the Pauper is resumed by the Practical L. Co.

In Cripple Creek, sixty tons is the daily output of the Mary McKinney. No attempt will be made to work below the 500-foot level on account of the water. A new

pump, capacity 2000 gallons a minute, will be installed at a depth of 800 feet. In the north the ore shoot has been proven up 2500 feet. The ore will average \$30 a ton.

At Cripple Creek the El Paso Co. will start a tunnel 4000 feet west of the present El Paso shaft, 4 1/2 feet in the clear. The El Paso has abandoned its old shaft and will hoist everything through its new one. The property is producing twenty-five tons of ore daily, which goes to the smelters.

The Woods Investment Co. will drive 100 feet more in the May Belle tunnel, located on the Lawrence townsite.

IDAHO.

ADA COUNTY.

The Dalse mine at Neal is sold to F. T. Day, representing the Western Loan & Guaranty Co. of Chicago, for \$225,000. An independent company will be organized to work the property.

BLAINE COUNTY.

The Croesus, at Hailey, is closed down pending the installation of a new hoisting and sinking plant, when sinking is to be summed.

BOISE COUNTY.

The new stamp mill on the North Star, near Boise, in Boise county, is in operation.

The New England Co.'s small dredger at Idaho City will continue work through the winter. It has been running with profit for the past four years. The company has a large shovel dredger half a mile farther up the creek, but it does not do as good work, taking the season through, as the small one.

Manager Ingle still has men at work in the Twin Sisters quartz mines, 1 mile east of Centerville. There is a shaft down 400 feet, from which considerable drifting has been done. A large portion of the values is contained in tellurides.

Men are at work in the Lincoln mine at Pearl; the mill is completed.

The dredger on Granite creek, 1 mile west of Placerville, is still running day and night successfully.

On Miller mountain, T. B. Coe, manager Nampa M. Co., has men on the Magnolia and Monica groups. He is locally credited with intent to put in a mill in the spring.

Buchanan & Bettcher have leased the Blaine mill and are running it.

M. M. Gibson of Boise says he will put in a smelter at Idaho City.

CUSTER COUNTY.

It is now a settled fact that the White Knob Copper Co., operating mines and a matting plant at Houston, will build a road from Kelton, Utah, to the mines.

ELMORE COUNTY.

The Bonaparte mine has been bonded by New York people. Work is to be resumed in the spring.

R. P. Chattin has bought the Franklin mine at Pine Grove and has men at work mining and milling ore.

Near Mountain Home, D. Kerby, superintendent Monarch mine, has struck the ledge at the 600-foot level. A. Davis has his Uba stamp mill running. Men are at work at the mine.

IDAHO COUNTY.

H. Mabin, a returned prospector, tells the Spokane Spokesman-Review that 200 men will winter in the Thunder Mountain district. The trails are closed to the transportation of supplies. There were 3 feet of snow on the Elk creek summit two weeks ago.

Ledges of unusual width are found in the Big Creek district. The ore bodies have an eastern dip and in some instances are 600 feet wide. The values are gold and silver, with some copper and lead. A number of claims will be worked this winter.

Hunter & Watson have bonded the Crown group, on Logan creek, and will employ fifteen men. They have taken in ten tons of supplies for the winter.

The town of Roosevelt has taken precedence over the other boom towns and now has a population of about 150.

OWYHEE COUNTY.

The Pauper mine at Silver City has resumed work after a shut-down of nearly a year.

SHOSHONE COUNTY.

Near Wardner, after over four years continuous rock cutting, the Bunker Hill & Sullivan Co. has connected every opening in its mines with the long tunnel, the mouth of which is at the mill, 2 miles below.

Wallace says the number of men working in the Coeur d'Alenes now is from 350 to 500 more than last year at this time. It is estimated that 3000 men have employment at the present time in the mines there. At Wardner mines, 1000; up Canyon creek—Tiger-Poorman, 50; Mammoth, 140; Hecla, 100; Standard, 245; Frisco, 250; at Mullan—Morning, 250; Hunter, 50; at the California (up Nine-mile),

45; at the sampler below Wallace, 35; at the mines at Murray and prospects (estimated), 400; at Hercules, 50; and the estimate of prospectors working their own claims throughout the district places the number of men at 3000.

Superintendent G. T. Edmiston is locally credited with intent to put 280 men at work on the Frisco mine and run the property to its full capacity, which would mean a concentrate output of 2000 tons per month, the mill having a daily capacity of 650 tons crude ore. Starting the Frisco means increased trade for Gem, where the mine is located.

Reports from the Cœur d'Alenes that mineowners there are planning to cut wages are denied by the operators. Wages in the Cœur d'Alenes are a minimum of \$3.50 for all men underground, except at Gardner, where the pay is \$3.50 and \$3. The day shift is ten hours and the night shift nine hours.

MICHIGAN.

HOUGHTON COUNTY.

The Calumet & Hecla C. M. Co. has declared a regular quarterly dividend of \$5 per share, amounting to \$500,000, payable Dec. 10, equivalent to 20% on the stock. This, with the \$5 dividends paid in August and May and the \$10 dividend paid in January, makes a total of 100% for this year. In 1900-01 the company paid 260%; in 1899-1900, 320%; in 1898-1899, 280%. In 1897-1898 the dividends were 160%, in 1896-1897 120% and in 1895-1896 100%. The dividends declared and paid to date by the Calumet & Hecla aggregate \$79,850,000. The dividends declared and paid to date by the old Con. Virginia and California mining companies and the present Con. Cal. & Virginia M. Co. amount to \$78,213,600. The Calumet & Hecla is still paying dividends; the Con. Cal. & Virginia is not.

MISSOURI.

JASPER COUNTY.

Conditions in the Joplin district are reported to be the most prosperous ever known. While ore is not so high as during the boom period of 1899, it is within \$5 or \$6 per ton of the average high market during that period, and fully \$12 a ton above the average market for the past ten years. The output for ten months ending October 31 amount to 454,000,000 pounds of zinc and 54,000,000 pounds of lead, which has sold for a total value of \$3,100,000. This amount exceeds by \$1,500,000 the cash value of the production for the corresponding period of last year. Zinc ore remains strong and steady at a \$35 basis, although some lots have been purchased at a price indicating a \$36 basis, while some lower grade ores have sold at prices equivalent to a \$34 basis. The market for lead ore remains strong and unchanged at \$49 50 per ton.

MONTANA.

FERGUS COUNTY.

At Helena the Chicago-Montana G. M. Co. is incorporated; C. D. Stephens, C. A. Denham and J. M. Carls, all residents of Chicago. The company propose to mine in Fergus county.

GALLATIN COUNTY.

The Anaconda M. Co., which bought the mines at Storrs a few months ago, is building 100 coke ovens and in addition to this and the work in the mines it is making a town near the mines. The company has about 150 men developing its coal mines and expects to increase the force as soon as the mines are better developed. No shipments of coal have been made. It is the intention of the company to make coke out of the product of the property.

GRANITE COUNTY.

The Montana G. M. Co. at Royal, operating the Sunday mine, is shipping gold to Helena.

JEFFERSON COUNTY.

The East Helena S. Co. is working an iron mine located near the summit of Elkhorn mountain. The product goes to the smelting plant of the company.

During October twenty-six mining claim notices were filed for record in Boulder. In one it was stated that the locator had discovered a valuable deposit of steel.

Basin reports that the Boston & Seattle M. Co., operating a group of mines in Jack Creek district, contemplate building a railroad to Basin and erecting a smelter. They will continue development work on the properties and put in machinery to treat the tailings dump there.

A. Ray has a lease and bond on the Buckeye mine, Cataract district, 3 miles north of Basin.

D. J. Sweeney of the Silversmith says the paystreak has widened out to 22 inches.

Operations on the Elkhorn mine in Jefferson county have been suspended by the Longmaid Brothers, of Helena, who have the property under lease. Final shipments of ore from the mine are now being made. The pumps have been pulled from

the shaft, but the workings are in good shape, and should the price of silver advance a few points the property might be started up again.

LEWIS AND CLARKE COUNTY.

The Providence M. Co. has incorporated; W. Swan, L. Buskett and J. R. Lockwood.

The Boston M. Co. has been organized to work the Mohawk, Snowbird and Badger claims near Corbin, 16 miles from Helena. H. Freyler of Corbin is manager. He will sink 200 feet on the Badger and crosscut the vein, which is 8 feet wide, with 2 feet of ore on the hanging wall. The ore assays 7% copper 11 ounces silver and \$2.50 gold.

MADISON COUNTY.

Fine and Schulenberg will operate their group of mines near Mammoth and run a tunnel that will tap several veins.

W. B. Millard, manager the Kennett M. Co., has a lease on the Shafner mill until August 1, 1903, and will add a concentrating plant. Ore from the Kearsarge mine is to be run through the mill.

MISSOULA COUNTY.

The Eureka M. & S. Co. is buying the Black Lead group of mining claims for \$100,000. The group is at the summit of the Bitter Root mountains, on the headwaters of the north fork of the Clearwater, 150 miles east of Lewiston, Idaho. Assays show 10% copper and \$10 gold and silver values per ton.

Manager E. W. Conrad of the Bald Mountain M. Co., Saltese, says work there proves the existence of copper veins, which are being exposed whenever greater depth is reached. The company is running a tunnel calculated to intersect its ore bodies at a depth of 650 feet. It will have a length of 1000 feet. This distance has been driven.

The Richmond & Monitor has passed into the hands of Minnesota and Montana mining men. Superintendent Cooney is sinking double-compartment shafts on each of the veins. The Monitor shaft is down 200 feet. The force of twenty-two men will be increased to thirty.

SILVER BOW COUNTY.

The Jennie Dell M. Co. is developing the Jennie Dell claim, west of Walkerville. The shaft is down 225 feet. The vein is supposed to be a continuation of the Blue Wing, of the Alice M. Co. The ore of the Blue Wing carries \$15 gold per ton and 30 ounces silver.

The Ophir mine, at the foot of Dakota street, Butte, is being unwatered. There are twenty men employed. When the water is out of the lower workings the number will be increased to forty. The object is to sink the shaft several hundred feet more with a view of finding copper veins.

The hoisting works of the Alice M. Co., recently destroyed by fire, have been rebuilt and operations resumed. Later the property may be equipped with machinery capable of working at a depth of 2000 feet.

In Butte W. A. Clark will reopen the Travonia mine, which is being unwatered. He contemplates reopening the Black Rock mine, northeast of Butte.

Superintendent A. Clark has resumed work on the Ophir mine. Additional men are at work in the West Stewart mine.

NEVADA.

ELKO COUNTY.

The Dexter-Tuscarora Co. shows production during the year of \$130,000, profit \$23,000, from 30,090 tons of ore. The total indebtedness has been reduced to \$9000 during the year.

EUREKA COUNTY.

Ore shipments by rail from Eureka district for the week ending November 14 were: Eureka Con., 147,660 pounds; Diamond, 62,680 pounds; Jackson, 33,720 pounds.

HUMBOLDT COUNTY.

The Foltz placer mine of Spring Valley, is reported sold to Chicago men for \$40,000.

LINCOLN COUNTY.

The Searchlight Parallel G. M. Co. is incorporated to work mines in Searchlight, the directors being Los Angeles men.

At the E. & F. Co.'s properties at Pioche, Manager Freudenthal says there are two classes of ore—one of them headed by copper and the other by silver—and while they occur in the same ledge, the channels are distinct. The latter shows 90 ounces silver, with an average of 18% lead; the copper ores show 25% of that metal, with an average of 25 ounces silver.

LYON COUNTY.

F. Leonard Jr. of the Gold Canyon Tunnel Extension Co., which proposes to extend a branch of the Sutro tunnel to Silver City district, is reported to have assurance that the funds guaranteeing the construction of the branch tunnel have been subscribed in New York, and that

as soon as the rest of the signatures of the mine owners necessary to the agreement can be obtained work will begin.

NYE COUNTY.

Manager Healy of the Salt Lake & Tonopah Co. is delivering high-grade ores at Sodaville. Underground work shows ores that carry 100 to 300 ounces silver per ton, with corresponding values in gold. The vein is from 4 to 7 feet between walls.

The Halifax-Tonopah Co. will sink a 600-foot shaft at Tonopah. I. Mackay superintendent.

A new steam hoist for the West End shaft at Tonopah is on the way. The shaft has been enlarged to 4x7½ feet. B. F. Edwards is manager.

An ore strike is reported in the bottom of the 390-foot New York shaft.

Operations have been resumed on the Homestead, the main shaft of the Little Tonopah Development Co.

The main shaft of the Tonopah City Co. will have a hoisting plant capable of sinking 1500 feet. The shaft is down 345 feet.

The Ohio-Tonopah shaft is below the 300 level.

The Butte-Tonopah M. Co., T. L. Oddie manager, has temporarily closed down, awaiting a steam hoist. It is the intention of the company to sink 500 feet and crosscut to the east.

The Miner says the management of the Tonopah Co. has decided to employ but two shifts of men each twenty-four hours, the day men working nine hours, the night shift eight, as heretofore.

The Tonopah M. Co. reports that only such ore has been taken out as was located in the line of development. This development work has produced as much first and second-class ore as it has been possible (together with what the lessees have offered for shipment) for the present transportation facilities to move to the railroad, and in addition to this quantity there has been placed on the company's dump 7000 tons of ore, graded as third-class.

From 500 assays taken daily this tonnage averages \$61 per ton. The company's main working shaft is on the Mizpah claim, 200 feet distant from the ledge at the surface. It is a three-compartment shaft, 5x17 feet, and has been sunk 515 feet.

It is proposed to continue sinking this shaft to a depth of 1000 feet. At the 500 foot level a station is being built. The Valley View shaft is near the center of the Silver Top claim and has been sunk 310 feet. At 340 feet it will encounter the crosscut now being run from the main working shaft at the 300-foot level. The Desert Queen shaft on the upper end of the claim of the same name is down 315 feet. At a depth of 414 feet it will be on a line with the 300 foot level of the main working shaft. All leases to operate the ground of the company have been terminated. The company itself is the only one performing any mining operations upon the property.

During the past four months the returns received from the smelters, after deducting freight and treatment charges, have amounted to \$450,000, more than one-half of which amount was for lessees' ore (taken out prior to expiration of their leases, Dec 31, 1901), out of which was deducted the 25% due the company and the balance was paid lessees.

WASCO COUNTY.
John Sparks says he will incorporate the Wedekind mine near Reno.
Manager Hopkins has three shifts of miners in the Great Western property at Steamboat Springs. The lead carries \$6.

WHITE PINE COUNTY.

The New York & Nevada M. Co. pays \$35,000 for the waters of Murray creek, near Ely.

NEW MEXICO.

GRANT COUNTY.

D. Burman claims that in his section "10% copper ore cannot be mixed at a profit. The smelter at El Paso pays \$1.45 a unit for copper. Ten per cent copper ore brings at the smelter \$14.50. Allow \$2 a ton for wagon haul from the mine to the railroad and \$2 50 for railroad transportation. When the smelter charges 12 cents for each per cent of silica in the ores, if the ore carries 70% silica the charge by the smelter is \$7.40; wagon haul, transportation and smelter charges total \$12.90. Deduct this from \$14.50, the total value of the ore, and there is left \$1.60 for mining. As the result of these prices, we have closed down our mines in New Mexico."

LINCOLN COUNTY.

S. B. Wise, for the Free Gold M. Co. at Juana canyon, Jicarilla district, will put in four concentrators, combined capacity 200 tons per day. The company have eight placer claims in Juana canyon and are drilling for water.

OREGON.

BAKER COUNTY.

T. R. Packard of Boston has bought the

Del Monte, near Sparta—four claims, on which much development work has been done.

The third rich ore shoot has been opened in the 900-foot tunnel of the Belcher mine.

The mill at the Cracker-Oregon mine is completed. The framework is done and the siding is up. Work on the interior is progressing rapidly. Upraises are being started to block out the ore.

The new stamps at the North Pole mill are in.

J. W. Larkin, managing owner of the Cougar, is resuming operations. R. A. Marr will have charge of the mill.

Superintendent E. J. Thorp of the Blue Bird M. Co. is crosscutting. The compressor will be installed Dec. 15.

JACKSON COUNTY.

Near Gold Hill, Superintendent Jackson is developing the Bouden and Yellow Jacket, getting ready for new drills and hoisting works.

Superintendent Phelps, at the Anderson mine on Foothills creek, has a vein 2 feet wide at a depth of 135 feet which goes \$25 to the ton.

Superintendent A. Orme has men putting the Ray mine in condition for a new 20-stamp mill.

Superintendent Mendenhall is putting in a gasoline engine at the Roaring Gimlet mine.

JOSEPHINE COUNTY.

The Harmon-Green placer on Galice creek has begun piling. The ground to be worked this winter consists of bars along the east bank of Galice creek 1 mile below the forks. The gold is coarse and of high quality.

The Wolf Creek M. & D. Co. has a large force at work on its quartz and placer properties. Besides four claims this corporation has 180 acres of valuable placer ground and water rights on Wolf creek. New ditches are being dug and flumes built, and three ledges are being faced off preparatory to driving a main working tunnel.

The Golden Drift M. Co. is building a power dam across Rogue river, 3 miles above Grant's Pass, and putting in immense gates and digging out the race and bays for twelve turbine wheels. The dam is built across the river; all that remains to finish its construction is to build it up the required height, giving a 20-foot fall to the water. The twelve turbines will develop 5000 H. P. The power house will contain two sets of pumps, one of which will force the volume of water to the giants in the placer diggings of the company, and the other will lift the water to three irrigating ditches.

MALHEUR COUNTY.

E. A. Hutchins, at Shasta creek, is developing a group of claims on the porphyry dyke in extension of the Black Eagle, where a 20-stamp mill is building. A 4-inch seam of ore has been traced through the eight claims on the dyke.

SOUTH DAKOTA.

LAWRENCE COUNTY.

Three mining companies are working within 1 mile of Cyanide, two of them—the Spearfish G. M. & I. Co. and the Deadwood-Standard M. Co.—producing bullion, and the third—the Potsdam G. M. Co.—is in the development stage. All three companies are working on the limestone plateau near Ragged Top mountain. The two former have cyanide plants and the latter is preparing to build one. The Spearfish Co. is daily reducing 300 tons of ore. The cyanide plant of the Deadwood-Standard Co. is treating 125 tons a day.

There have been thirteen mine accidents resulting in loss of life and nine resulting in serious bodily injury in the Black Hills during the ten months of 1902, according to the report of the State mine inspector, T. Gregory.

The bullion production for the ten months of 1902 is \$7,342,216 56, as against a little over \$3,000,000 for the twelve months of 1901. The ore tonnage and gold bullion output of the different mines for the past ten months have been as follows:

Mines.	Tons.	Value.
Homestake.....	1,218,089	\$4,303,977 57
Golden Reward.....	161,000	1,223,688 99
Horseshoe.....	45,000	575,000 00
Holy Terror.....	15,000	180,000 00
Portland.....	12,000	84,000 00
Clover Leaf.....	20,800	80,320 00
Dakota.....	36,623	150,000 00
Rooster.....	15,000	90,000 00
Wasp No. 2.....	25,000	75,000 00
Imperial.....	25,000	180,000 00
Spearfish.....	23,000	165,000 00
Deadwood—Standard.....	5,000	20,000 00
Golden Slipper (estimated).....	.....	20,000 00
Placer (estimated).....	.....	100,000 00
Alder Creek.....	10,800	46,231 00
Miscellaneous.....	.....	50,000 00

Totals.....1,612,312 \$7,342,216 56
There are 3207 miners and millmen em-

played around the various mines of the Black Hills, of which the Homestake employs 1700, the Golden Reward 400, the Horseshoe 200 and the Imperial 100. These four companies are the largest employers in the region.

The Jupiter G. M. Co. has a two years' bond and lease on the mining property and 40-stamp mill of the Boston-South Dakota M. Co. in Blacktail gulch. J. Hartgering will build a cyanide annex of 150 tons daily capacity.

At Deadwood the directors of the Black Hills Mining Men's Association have organized by the election of the following officers: H. Franklin, Deadwood, president; G. M. Nix, Lead, first vice-president; S. W. Russell, Deadwood, second vice-president; J. E. Pilcher, Custer, third vice-president; W. S. Elder, Deadwood, secretary and treasurer. These are the officers who served last year with the exception of third vice-president, that office not being filled at the organization a year ago. Other directors of the Association are J. Gray, Terraville; J. Blatchford, Terry; C. H. Fulton, Rapid City. The executive committee of the Association has the work of preparing for the entertainment of the American Mining Congress in 1903 well under way, and has raised sufficient money to more than meet the pledges given at the Butte session of the congress. A committee has been appointed by the chair on mines and mining, the work of this committee consisting chiefly of investigating the operations of various mining companies that are in process of promotion and selling stock, this being done with a view to protecting outside investors. The fundamental principle of the Association is to keep mining on a par with other lines of business as to honor and integrity.

At Lead the Hidden Treasure Co. is placing machinery at the Bingham shaft. Development work continues on the Baltic tunnel of the Hidden Fortune. The tunnel is now in over 2000 feet and there are five crosscuts to the right and left, penetrating the parallel veins of ore between which the main tunnel is being driven.

A shipment of ore is being made ready on the claims purchased by the company of O. P. T. Grantz. Several hundred tons of the ore is in sacks and the company is taking out a ton and a half a day that will, it is reported, average \$1000 a ton. It is estimated that the shipment about to be made will bring \$30,000. It will be sent to a smelter at Denver.

The Horseshoe M. Co. will begin work on its new cyanide plant at the Mogue mine, near Terry. W. H. Elliott is foreman for the Horseshoe Co. on the work it is doing west of the Spearfish. The new cyanide plant will require 3,000,000 feet lumber, capacity 1000 tons a day. The contract requires completion by Jan. 18. The plant is to be connected with the various mines of the company by an aerial tramway system. The company has lately enlarged the Pluma cyanide plant from 100 to 300 tons a day, and is running it regularly on ores from the Ruby Basin and Bald Mountain mines. Only the medium grade ore is being cyanided, the company shipping the better grade material to the smelter lately purchased of the National Smelting Co. at Rapid City, which is running full capacity of 300 tons a day, largely on Horseshoe ore, with some custom.

PENNINGTON COUNTY.

R. M. Maloney at Sheridan will resume work on the Maloney Blue Lead group. Three shifts of eight hours each will be put to work before the end of the week, and the drift will be extended 700 feet farther.

UTAH.

JUAB COUNTY.

At the Utah mine, Supt. C. Crismon, at Fish Springs, says on the 300-foot level samples show 500 to 1000 ounces of silver to the ton.

The new aerial tramway of the Grand Central at Eureka is in operation.

SALT LAKE COUNTY.

The U. S. smelter is in operation.

SUMMIT COUNTY.

The Little Bell of Park City will sink its 300-foot shaft 200 feet more, followed by drifting and raising on the ore in the drifts in the 300 level.

Supt. Mixer of the Creole of Park City has ore that shows ten ounces silver, 20% lead, \$2 gold per ton.

Manager Dodge is pushing the tunnel project of the Southwest Quincy M. & T. Co., which starts in Pine canyon and heads for the Quincy and Daly-West, nearly a mile. It will run through about thirty claims belonging to the projectors; the depth will average on the thirty claims 1750 feet. The tunnel is in 300 feet, and its course will tap the Superior, Copper Queen and other ledges.

The American Flag Co., Park City, has

started its new hoisting plant. The high-grade rock is being sacked.

TOWNE COUNTY.

The Con. Mercur in the face of the Electric tunnel is beneath the boundary line of the Ingot property, where ore equal to any of the bodies of that property has been tapped. Connection will be made with the tunnel from the Ingot shaft.

WASHINGTON COUNTY.

At St. George the Silver Reef Leaching Co. have started their plant on the tailings at the Christy dump.

WASHINGTON.

FERRY COUNTY.

C. P. Robbins of the Lone Pine-Surprise Co. has returns on fifty tons of ore sent to the smelter, which showed values of \$24.36—\$22 40 gold and \$1.96 silver. The ore was broken down in timbering.

OKANOGAN COUNTY.

Manager G. Wehler of the Nighthawk and Favorite mining companies, near Loomis, is sinking on the first ledge on the Nighthawk. The tunnel at the Nighthawk is in 674 feet.

Manager Lewis is driving a tunnel on the Mammoth. From Oct. 15 to Nov. 1 he had made 40 feet in slate.

SNOHOMISH COUNTY.

The Index Independent Con. M. Co., 5 miles east of Index, has a working tunnel and a drift from the crosscut, the face of which is now within 150 feet of the ore shoot.

WYOMING.

CARBON COUNTY.

A group of locations, comprising 360 acres adjoining the Ferris-Haggerty property, is bought for \$150,000 by Utah men, including Messrs. Kearns, Bamberger, Keith, Newhouse and Dickson.

FOREIGN.

BRITISH COLUMBIA.

Thos. Drummond of Keithley creek and Forks Quenesling divisions of Cariboo district says he has fitted up the Norberry dredger and started it to work.

E. B. Kirby, manager Center Star and War Eagle mines, concerning local report of the sale of the Canadian Pacific Smelting Works at Trill to the Gooderham-Blackstock syndicate alleged to have occurred, says there is no truth in the story.

T. Jones, representing the zinc smelting works of Iola, Kas., has been looking at the Pilot Bay smelter, and says that if satisfactory arrangements can be made a combination of that plant with that of the Kaslo sampling works is probable, the Kaslo plant to be used for the partial treatment of zinc ores of that district preparatory to their shipment to the Kansas works at the \$11 rate lately offered by the railway company.

W. Y. Williams, superintendent Granby mines, expects to be able to double the present rate of ore shipments to the company's smelter at Grand Forks this week. At present the rate is 750 tons per day.

Forty actions for damages against the Crow's Nest Pass Coal Co., aggregating \$500,000, growing out of fatal explosion last May, will be heard in the Supreme Court next January.

The Golden smelter is to be operated by water power and is to cost \$20,000. A laborers' co-operative company is the promoter.

The Mines Exchange, Ltd., Nelson, reports in Nelson mining division a strike on the Gold Hill location, at the head of Forty-nine creek, 12 miles from Nelson.

The 6-mile wire cable for the Venus-Athabasca tramway has been hauled to the property.

The Highland mine is employing sixty men. Twenty tons ore is the daily average treated.

On the the North Fork of the Salmon river on the Relief there are twenty-five men working. The 10-stamp mill is in operation. On the Arlington there are twenty-seven men at work.

There are about thirty men placer mining along the North Fork.

The stamp mill at the Wilcox mine, near Ymir, will be in operation next month.

In Lardeau thirty-five men are employed on the Oyster-Criterion. A tramway and mill will be installed in the spring. The property is an extension of the Eva lead.

At the Great Western mine five drill compressors have been put in.

J. Wardner has an option on the Morgan group.

A meeting of the local miners of the Slocan was held at Sandon on the 20th inst. to consider a proper presentation of the lead situation and the means for get-

ting better prices to W. A. Galliher, K. C., M. P., who is to take up the matter at the next meeting of the Dominion House of Parliament. C. X. Hardy of the Rico mine, George Hughes of the Sunset and A. C. Garde of the Payne constituted the committee who had the meeting in hand. G. B. Roden, representing the American Smelting & Refining Co., is making an investigation of the silver-lead industry of the Kaslo-Slocan district, with the object of reporting on the feasibility of building a smelter here.

The Triune tramway is about finished. F. F. Fulmer and associates have full control of the Beatrice group, Mohawk creek, Fish Creek district.

In Slocan the Scottish Colonial Syndicate, owning a three-quarter interest in the Alma group of claims and concentrator, has bought the remaining quarter interest from G. Hughes for \$75,000.

Grand Forks reports that the coal miners' strike at Michel has had the effect of restricting shipments of coke to the Boundary district, and the reserve supply at the smelters is limited. The Granby plant for weeks past, owing to low water, has been running only two furnaces. A portion of coke used in the Boundary comes from Michel.

The transformers for the substation of the Cascade Power Co., at the Granby plant, means the addition of 100 men to the payroll; an additional 200 men will also be added to the payroll of the Granby mines at Phoenix.

The smelter plant at Marysville in the Lardeau will not be proceeded with this winter. All operations have been suspended and nothing is said as to a resumption. The characteristic ore of the Lardeau is silver-lead sometimes carrying gold. The plant was erected on the reverberatory system and it is said that while it would undoubtedly operate on gold-copper ores that it could not handle the silver-lead ores with marked success.

MEXICO.

Official figures show development of the mining industry in Mexico. During the ten fiscal years that began July 1, 1892, and ended June 30, 1902, mining titles to the number of 17,929, covering in total 529,670 acres, were issued. The greatest development has been made in the last three years.

GUANAJUATO.

G. W. Bryant is resident manager of the Aparecida Mines Co. of Guanajuato, which has 114 acres between the Rayas and Irena mines.

SONORA.

The Torreon Enterprise says that since the Guggenheims have failed to purchase the smelter there, they will construct a plant of their own there. It is apparently authentically stated that the new smelter which they will build will be of 1000 tons daily capacity. They have control of some leading mines at Velardena, Parral and Santa Barbara, which will give them sufficient ore to keep them running at full capacity.

The smelter at Cananea is shut down temporarily because of scarcity of coke.

PERU.

The American minister, I. B. Dudley, at Lima, in a report to the State Department, says: Owing to the fall in the price of copper the entire industry has undergone a certain paralysis, but it is expected that the energy and ability of Americans, who have established some of the largest plants in Peru, will contribute to the highest prosperity before long. The introduction of American methods of exploitation and of American machinery already have reduced the cost of production to a low figure, and the building of new railroads have enabled native miners to find a new and wider sphere for the industry.

SOUTH AFRICA.

From Johannesburg H. Kingsmill writes to J. J. Davis of Spokane: "Johannesburg is still under martial law and there is a very great scarcity of native labor for mines. Only 30% of what is required is available; there is a feeling of unrest among the large operators as to how much of a load the Imperial Government will put on the country for its part of the cost of the war. The military are using the railway transporting troops around, so that it is almost impossible to get supplies and freight up from the coast. It is a very expensive place in which to live. Board and room in a private family cost from \$45 to \$65 a month. I have been working in one of the deep levels stopping on the 2200-foot level of the Robinson deep. I am in charge of three Ingersoll drills. I don't like it much, as I speak but little Kaffir. I have ten negroes for the three machines. A few of them are good men, but the others are a lazy, shiftless outfit. The rock is not

hard, and is the most even drilling I have ever seen. All the machinery and most of the mine managers are Americans. I advise no one to come here looking for day's wages, although there are great openings for speculation in real estate."

RHODESIA.

The dry crushing process is in operation on the property of the Wanderer Selukwe Gold Mines, Ltd., erected by the London & Hamburg Gold Recovery Co., Ltd. After the ore has passed through the bin and grizzlies, it is conveyed to two stone breakers, which reduce it to small pieces. Then falling through chutes, these pieces are pulverized by roller mills. An elevator conveys the ore to the top of the building, from whence it further falls through chutes into two large revolving cylinders, which are heated by steam pipes and hot air. Here all the moisture is extracted from it, and it is then conveyed by an elevator to magnetic drum at the top of the building, where the iron is attracted. Passing through two revolving sieves, it enters the separating boxes, Spitzkasten, where a weak cyanide solution and revolving screws separate the slimes from the sands. The former, being lighter, rise to the top and are conveyed to the agitator vats. The sands, however, pass into the spitzen, where the coarse and fine sands are distributed to their respective cyanide vats. The ore which is too large to pass through the revolving sieves is pulverized again by a roller mill and undergoes the same process as after leaving the revolving cylinders. There are also large tubes which convey the dust to a special chamber where it is precipitated, and from time to time taken out to be treated by cyanide. In the agitator vats the slimes are agitated by large revolving paddles, to give the cyanide free play, and when they have been treated sufficiently the solution is conveyed to the precipitating house, while the refuse slimes are carried away in trucks. The coarse sand vats are divided into four compartments, revolving launders distributing the sands. Here the cyanide solution percolates through false bottoms constructed of layers of matting and boards, and is then conveyed by pipes to the precipitating house, while the sands are discharged by doors at the bottom into trucks below. The fine sand vats are provided with Butter's distributors, which, revolving, distribute it evenly. Here the solution percolates through false bottoms similar to those mentioned above, before being conveyed to the precipitating house. The cyanide house has precipitating boxes for the precipitation of the gold, while the cyanide solution is pumped into large sumps to be strengthened before being used again. This process, although intricate in comparison to the wet crushing, is said to be satisfactory in extracting the gold, and cheaper to work, as it requires less water, and less labor is involved.

TURKEY.

At present there are four districts in Turkey in which anyone who so desires may enter into the business of meerschaum mining simply by paying the Ottoman government the sum demanded for a license, namely, 5 piasters. These districts are Sari-Sou, Septedji, Gelkli and Menlon. The 5000 miners already engaged in this industry are Kurds and Persians, and all of them work according to the most primitive methods. They are formed into gangs composed of fifteen men at the most, under the authority of a sort of section boss. The first work done consists of sinking a well until the miners come to a reddish clay soil, which indicates the presence of the meerschaum, this latter being found at a depth varying from 10 to 200 feet. The meerschaum appears in the form of round lumps, more or less irregular in form, the size of which rarely exceeds 30 or 40 cubic centimeters, and the usual size of which is about that of an apple or a walnut. When they reach the bed the miners dig horizontal galleries through the red clay, and as there is no direction or plan pursued, the gangs frequently meet each other. The work is carried on night and day by means of petroleum lamps, the blocks of meerschaum being brought to the surface still embedded in their matrix. On the weekly sale day the workmen meet and sell their goods to the "luledjis," or pipe manufacturers of Eskichehir. The blocks are then taken to the town and washed, after which they are cut into suitable pieces while the matter is still very soft. Sorting and classing is then proceeded with, and the "luledjis" in their turn sell their purchases to the larger dealers, who export the meerschaum, carefully enveloped in cotton wadding.

Meerschaum is composed of about 70% of carbonate of magnesia, 25% of silice, and 5% aluminum.

Personal.

SAMUEL NEWHOUSE of Utah is in New York City.

W. W. OLIVER is foreman at the Mayer, Ariz., smelter.

WM. UREN of Idaho Springs, Colo., is at Kennet, Cal.

P. S. MUSSIGBROD of Garnet, Mont., is in New York City.

CHAS. KNIGHT is manager the Hub M. Co., Beaver, Utah.

L. U. LOOMIS is manager Gladstone M. Co., Pioneer, Mont.

C. D. LANE has returned to San Francisco from Nome, Alaska.

J. W. STARKWEATHER has returned to Denver, Colo., from Mexico.

W. L. COOPER is manager the Progressive M. Co., Leadville, Colo.

GEORGE TEAL is now manager Livingstone mine, Wall Street, Colo.

C. C. BOURNE has organized the Bonito M. & M. Co., Nogal, N. M.

B. C. RIBLET of Nelson, B. C., has returned there from Denver, Colo.

G. W. NELSON of Denver is examining mining properties in New Mexico.

P. SHEEHAN is superintendent Jonny mill, Stateline, Iron county, Utah.

D. WARD of Georgetown has charge of the Gold Dirt Co. at Empire, Colo.

J. K. MERRILL is manager Calumet & Arizona smelter, Douglas, Arizona.

O. A. PALMER of Salt Lake is testifying in a mining suit at Spokane, Wash.

L. F. BROWN is general manager Pacific Steel & Wire Co., Oakland, Cal.

G. F. COFFEY has returned from Dawson, Alaska, to North San Juan, Cal.

H. C. HOLTHOFF of Milwaukee, Wis., has returned there from Denver, Colo.

M. S. FALLIS of Denver, Colo., will have charge of the Metals Volatilization Co.

W. F. COLLINS of British Columbia is examining mining property in Colorado.

F. F. WEBER is assistant superintendent East Klondike mines, Nye county, Nev.

J. R. H. ROBERTSON of Denver is in San Luis Potosi, Mexico, for a few months.

D. McDONALD has resigned as superintendent New Era M. Co., Searchlight, Nev.

CHAS. ECKHART is superintendent Montana G. M. Co., Granite county, Montana.

F. E. WOODBURY has been appointed superintendent Quincy mine, Houghton, Mich.

L. W. ALDRICH of Denver will spend some time in Mexico looking after mining interests.

J. P. OWEN, manager Sierreta M. & M. Co., Oro Blanco, Arizona, has gone to New York.

L. B. JONES, superintendent Red Rock mine, Big Bug, Ariz., has returned there from Boston.

L. GREENGOOD succeeds J. Bartrem as superintendent Prosperity M. Co., Prescott, Arizona.

JAMES LINDSEY has returned to Portland, Or., from head of White and Copper rivers, Alaska.

W. H. HILL goes to Mellen, Arizona, to aid in the construction there of a 40-stamp gold mill.

H. E. NELSON, engineer with American S. & R. Co., Denver, has been transferred to Durango, Colo.

P. HAMPTON, formerly manager Dixie mine, Idaho, is now in charge of the Daisy mine, Neal, Idaho.

W. H. COX succeeds G. R. Hancock as superintendent White Knob Copper M. Co., Mackay, Idaho.

L. T. WRIGHT, general manager Mountain Copper Co., Keswick, Cal., has returned from England.

W. A. AKERS has returned to Salt Lake, Utah, from an examination of Montana mining property.

SUPERINTENDENT GENDER of the Trilune mine, Ferguson, B. C., will operate the property all winter.

S. GILMORE, late foreman Ready Bullion mill, Juneau, Alaska, has resigned and goes to South Africa.

F. T. LLEWELLYN succeeds G. F. Meehan as general manager Monterey F. & M. Co., Monterey, Mexico.

J. P. EVANS, of the Colorado Iron

Works Co., is installing a smelter for the Majestic Co., Milford, Utah.

J. T. THOMPSON, superintendent Kenross mine, Calaveras county, Cal., has returned there from New York.

F. L. SWEARS goes to Friena, Chile, S. A., as assistant superintendent of a gold and silver mining company there.

GENERAL MANAGER JAMES HUTCHINSON of the Trade Dollar Consolidated M. Co., Silver City, Idaho, has resigned.

J. W. SPAULDING, former superintendent Mellen M. & M. Co., Juneau, Alaska, has opened an assay office in Baker City, Or.

J. F. MORA is foreman Salvador mine, Jesus Maria, Calaveras county, Cal. He will enlarge the mill from ten to twenty stamps.

H. G. VERCOE, formerly in charge of Gavilan gold mines, Perris, Riverside county, Cal., is now superintendent Fresno Copper Co., Ltd., Clovis, Cal.

J. J. CHAMBERS has returned to Redding, Cal. In Canton, O., he formed another company to operate Shasta county, Cal., mining properties.

R. R. WHEELER, former superintendent Golden Cross mill, Hedges, Cal., is now master mechanic reduction division Cananea Copper Co., La Cananea, Mexico.

J. COLQUHOUN of the Arizona Copper Co., and A. McLean, superintendent Metcalf mines, are in Hachita, N. M., examining mines with a view of purchasing ores for the A. C. smelters.

W. OXNAM has resigned the superintendency of the mines of the Bully Hill M. & S. Co. at De Lamar, Cal. Superintendent Keating, superintendent of the smelter, is now in charge of the mine.

M. D. THOMAS, former foreman Trinity Copper Co., has taken the general foremanship of the Bully Hill mines, under the general superintendency of G. B. Keating, the latter succeeding W. Oxnam.

H. B. MAXSON of the surveying department of the U. S. Geological Survey is at Pioche, Nev., to receive a report from an engineering corps he has had in the field all summer and which has surveyed 250,000 acres unplatted land.

BERNARD MACDONALD has resigned his position as manager and consulting engineer of the Le Roi No. 2 mines at Rossland, B. C., and intends to open an office at Spokane, Wash., from which as headquarters he will carry on the business of consulting mining engineer after January 1st, 1903.

F. K. BORROW has resigned the superintendency of the Contention mine, San Miguel county, Colo.; goes to Buluwayo, Rhodesia, South Africa, to take a position with a mining company of which D. B. Huntley, formerly manager Tomboy mine, is now manager. C. H. Wittenoom accompanies him.

Commercial Paragraphs.

F. P. RUSSELL is manager Portland, Or., branch house of Henshaw, Buckley & Co., machine supplies; principal place of business, San Francisco.

H. CHAPPELL has returned to California from Mongolia, and is superintending the delivery of a large amount of machinery contracted for from the Daniel Best Co. of San Leandro, Cal., including several of their traction engines which have found such favor in this and foreign countries.

THE J. H. Montgomery Machinery Co. of Denver, Colo., write that they are working day and night shifts to complete several rush orders, which include a copper smelting plant for Monterey, Mexico, one of their patent 5-stamp mills for northern Idaho and a supplementary order for twenty coal cars, to be added to the fifty recently ordered from them by the Black Warrior M. & M. Co. of British Columbia. They also report several orders for ore cars and buckets from Chihuahua, Mexico.

RECENT shipments made by the Colorado Iron Works Co. of Denver, Colo., are: One smelting equipment for Mynboun Maatschappy Soemalata, Amsterdam, to be shipped to the Celebes islands, Dutch East Indies; ninety-six water jackets for American Smelting & Refining Co. at Monterey, Mexico; fifty water jackets for the Globe Smelting & Refining Co., Denver, Colo.; one set 40x16 Improved Standard rolls for the Economic mill, Victor, Colo., making four sets of these rolls now in use at this mill; three iron-top Bartlett tables for Mexico.

THE Western Engineering & Construction Co., successors to Griffin & Cameron, Pacific coast representatives The Bucyrus Co., placer mining machinery, Robins

Conveying Belt Co., ore, stone and coal conveyors, 209-210 Safe Deposit Bldg., San Francisco, Cal., write that they have finished three dredgers in the Oroville, Cal., district within the last two months—one dredger for the Cherokee Dredging Co., one dredger for the American Gold Dredging Co. and one dredger for the Butte Gold Dredging Co.—and that they are at present at work on a large 5-foot dredger for the Leggett-Wilcox Co., Oroville, and on the second dredger for the Indiana Gold Dredging Co., Oroville. They state that they have also a contract for an electric transmission plant and dredger at Atlin, B. C.

Copper Statistics.

The monthly copper statistics, prepared by John Stanton, show that the production in October of United States reporting mines was 24,152 tons, and production from outside sources (estimated) 2100 tons, a total of 26,252 tons, or 464 tons in excess of the September production. The production of foreign reporting mines in October was 9707 tons, or 552 tons more than in September. United States exports in October were 12,515 tons, a decrease of 668 tons from September. The production in the United States mines compares as follows (in tons of 2240 pounds):

	1902-01.	1901-00.
October.....	26,252	24,098
September.....	25,788	21,580
August.....	25,206	22,667
July.....	26,749	21,985
June.....	26,740	22,401
May.....	25,763	22,392
April.....	24,624	8,810
March.....	24,035	23,384
February.....	20,331	21,100
January.....	18,955	22,679
December.....	19,803	22,124
November.....	21,728	23,276

Foreign production figures (in tons of 2240 pounds):

	1902-01.	1901-00.
October.....	9,707	8,960
September.....	9,155	9,477
August.....	9,504	8,180
July.....	9,210	9,254
June.....	8,202	8,522
May.....	9,354	8,456
April.....	10,169	8,810
March.....	8,979	7,817
February.....	8,475	7,332
January.....	7,367	5,910
December.....	8,677	8,483
November.....	8,864	7,752

Exports from United States (in tons of 2240 pounds):

	1902-01.	1901-00.
October.....	12,515	8,016
September.....	13,183	6,419
August.....	12,429	6,840
July.....	11,733	6,824
June.....	14,027	6,842
May.....	16,283	10,062
April.....	16,424	4,849
March.....	20,097	6,818
February.....	16,108	8,453
January.....	15,021	10,003
December.....	10,171	11,223
November.....	6,367	9,508

Catalogues Received.

"Labor-Saving Appliances and Power Transmission Machinery" is the latest of the Jeffrey Mfg. Co.'s issues—a solid, substantial little volume, 6x8 inches, 375 pages, portraying chain belting, steel cable, elevating and conveying machinery and innumerable other devices and apparatus of economic value to industrial workers, with illustrated description and price lists, finely indexed. Issued by the Jeffrey Mfg. Co., Columbus, Ohio.

"Jessop's Steel and How They Make It," is a dainty delineation of steel manufacture at Brightside, Sheffield, England, by William Jessop & Sons, whose record as successful steel makers runs back to 1774. Anyone not knowing anything of this leading firm seeing this little volume in olive and crimson would necessarily be favorably impressed, and a casual glance through its pages would further accord some down-to-date information on how good steel is made.

The latest 48-page catalogue of the Atlas Car & Manufacturing Co. of Cleveland, O., has several illustrated details of mine car construction of interest to any one having use for such devices. There is a wealth of suggestive detail embodied in different forms of mine cars, "soft mud car," "stiff mud car," "double deck car," "triple deck car," "mud rack cars," "dryer cars," "core oven cars," etc. There are thirty-two different designs of mine cars shown, beside turntables, portable tracks, etc., making a trade treatise on

mine cars worth noting. The two catalogues, 1008 and 1012, will be sent to any address on request.

Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

BRIQUET-MAKING MACHINE.—No. 712,696. Nov. 4, 1902. R. Martin, San Francisco, Cal., one-half assigned to S. P. Smith of same place. This invention relates to a machine which is designed for the manufacture of compressed blocks or briquets of coal mixed with some binding material, so that the pulverized coal and binding material can be compressed into solid blocks of suitable size, shape and hardness, so that they break in handling and make them serviceable as fuel. The machine consists of a horizontally revolvable table having two sets of radially slidable plungers movable in line with each other by the action of suitable cams. Above and in line with the path of travel of the outermost plunger is an annular hopper into which the properly mixed coal and binding material are delivered, and the outer plungers move transversely across the channel which is filled from this hopper. The material is forced from this hopper into the mold by the movement of the outer plungers, and the outer ends of the inner plungers act as stoppers to stop the inner end of the mold, while the outer plungers are moved sufficiently to compress the material within the mold. Then the inner plungers retract while the outer ones continue to follow until the briquet is discharged from the mold into a space through which it may drop away from the machine.

ROTARY SCRAPERS.—No. 712,838. Nov. 4, 1902. R. H. McCaughey, Campbell, Cal. This invention relates to improvements in dirt scrapers. It is particularly intended for use in blocking up corners in orchards before irrigating. Its object is to provide a device which can be easily dumped and which will automatically right itself, allowing the operator always to remain hold of the handles. It consists of a scoop or shovel adapted to slide along the surface of the ground, handles pivoted to lugs upon the sides of the scoop, projections on the rear of the latter, spring-actuated latch members engaging said projections, one of said latch members connected with a hand lever upon one of the handles by which the latch may be released to allow the scoop to dump and the other of said latch members adapted to engage the scoop when the latter is again righted and hold it in proper relation to the handles.

OIL HEATING AND HEAT REGULATING DEVICE.—No. 713,345. November 11, 1902. G. Porter, San Francisco, Cal. This invention relates to an apparatus for applying the heat derived from the combustion of oil to galvanizing or metal coating tanks and in a means for regulating the application. It consists in an apparatus for melting metals, the combination of a centrally disposed melting tank, a wall surrounding the same and forming a channel between itself and the tank, said wall having openings slidable in line with it; a hollow conductor forming a closure for the top of the channel and having openings in its outer side connecting with said channel; and valves or gates mounted in said openings in the wall, slidable horizontally across the channel and having their inner ends adapted to shut endwise against the outer wall of the tank.

ROTARY ENGINE.—No. 713,301. November 11, 1902. J. C. Hagerty, Santa Cruz, Cal. This invention consists of a smooth circular disk eccentrically mounted within a circular casing, so that at one side the periphery of the disk forms a tight joint with the interior of the casing as the eccentric revolves, an abutment slidable in line with the shaft and means for moving it to maintain it continually in contact with the periphery of the revolving eccentric, means for admitting a medium under pressure upon one side of the abutment between the eccentric and the casing, so that the pressure will act upon the larger diameter of the eccentric, and means for exhausting the medium from the opposite side of the abutment. Also devices for adjusting the eccentric to maintain the joint between it and the casing, means for adjusting the mechanism by which the sliding abutment is actuated, and other details of construction.

STEAM GENERATING FURNACE.—No. 713,296. November 11, 1902. J. L. Groux, Jerome, Ariz. This invention relates to a combined furnace and steam generator. It consists essentially of a brick-lined crucible forming the lower part of the furnace, a water jacket section composed of boiler iron properly braced, with tyces through the inner and outer walls to admit air, has an inlet and outlet, and a water tube section located above the jacket and surrounding the furnace, said sections being connected with the water jacket below and a steam drum above.

RAIL JOINT.—No. 713,334. November 11, 1902. O. Niehaus, West Berkeley, Cal. This invention relates generally to improvements in joinery, and particularly in means for joining or splicing the sections of stair rails and the like. Its primary object has been to devise means of locking an ordinary round-headed carriage bolt against turning while the nut is being screwed on or, conversely, to anchor a nut against a round-headed bolt is being screwed into the nut. It consists of a washer having lateral projections or prongs and a central or polygonal perforation, said washer fitting over a bolt and adapted when the prongs are driven into the wood to prevent the bolt from turning. The nut may be embraced by a similar washer and be anchored in a similar manner.

ORE CAR.—No. 713,311. November 11, 1902. W. C. Matteson, Stockton, Cal., one-half assigned to D. C. Matteson, same place. The object of this invention is to provide a car of simple and economical construction that is easily dumped and righted in which the operation of dumping and the door is effected automatically. It consists of a novel form of dust-proof bearing and means for securing the wheels to the axle and to the frame, a centrally disposed rocking hinge support for the car body on which the latter is tilted to dump its load, a door pivotally hung at the top on one end of the car body, and a lever pivoted to a connecting sleeve embraced by the door hinge and secured independently of the hinge to the outside of the car body, and latch means by which the door is released or engaged automatically, according as the car is oscillated.

MINING AND SCIENTIFIC PRESS

Whole No. 2210.—VOLUME LXXXV.
Number 22.

SAN FRANCISCO, CAL., SATURDAY, NOVEMBER 29, 1902.

THREE DOLLARS PER ANNUM.
Single Copies, Ten Cents.

A New Mining Building.

On the 18th inst., on the grounds of the University of California, at Berkeley, Cal., was laid the cornerstone of the new mining building to be used by the Mining College of the University. The building will cost when completed \$500,000. This is the gift of Mrs. Phoebe A. Hearst, and the building is to be a memorial of her late husband, Geo. Hearst, a California miner. It is the first of the structures for which Mrs. Hearst proposes to spend \$10,000,000, with the idea of having buildings of size and style commensurate with the character of the University of California.

The cornerstone was laid with all due ceremony. The California Miners' Association, which was in annual session in San Francisco, adjourned and participated in the event. Benjamin Ide Wheeler, the president of the University of California, delivered an address. Among other things he said: "Out of the seething ebb and flow of shifting public interest,

"The administrative department, with public and private offices for the dean, will open at the west of the memorial vestibule. On the east will be a lecture room and an office for the curator of the museum. At the north will rise marble stairways, in double flights, leading to right and left.

"The general mining laboratory will open on the central axis, opposite the main entrance. It will be virtually a great central court, 46x118 feet, open to the roof and lighted from above. A traveling crane will provide for the moving of heavy mining machinery. Broad galleries at the height of the first and second stories will serve as corridors and as vantage points for viewing operations.

"In the east wing there will be metallurgical laboratories for juniors and seniors, in the west wing research laboratories, and in the central northern portion of the building a dry-crushing tower, three stories high. The tower will be flanked by two rooms, 40x62 feet in size, one to be used as a smelting room for copper and lead and the other for a gold and sil-

to be true, have something of the rude, cyclopean. The emotion roused must be a sense of power rather than of grace. Even the scale of materials, the blocks of stone of which the walls are built, should be holder and more strongly masculine than that of any other structure likely to find a place in a great university. To produce a design for a mining building which shall in all sincerity express its purpose, and at the same time shall harmonize with future buildings quite as sincere in the expression of their purpose—purposes in almost every case of greater amenity—this has been the aim of the architect in approaching his task in its artistic phase. If in its treatment he shall have secured a true outward and visible expression of the inward and spiritual organism of the building, and if at the same time he shall have succeeded in throwing over it a degree of charm which shall make it seem a kind, bluff brother among a bevy of lovely sisters, he will feel that his efforts have not been wholly in vain."

"This, then, is the memorial we found to-day—het-



The New Building for the Mining College, University of California, Berkeley, Cal.

in the midst of the vain and transient cries of market place and forum, rise the solid walls, the stern, clean pillars of the university to vindicate in the name of that assembled and clarified knowledge we call science, that harmony of form we call art, and that digest of experience we call history, the steadiness and order of human life, and to proclaim that man liveth not by bread alone and that it is the things of mind and spirit which are eternal.

"The building which is to rise here will be dedicated to the use of the college of mining. It is to be built of the strongest and cleanest stone produced out of the California hills. When completed it will not only be the largest, but the most completely equipped building devoted exclusively to the study of mining engineering in the world. The plan of the building has been devised, after long and patient study, by the supervising architect of the university, John Galen Howard, who has worked in constant conference with Dr. Samuel Benedict Christy, the dean of the college of mining. Between them these two men have visited nearly every mining and technical school of rank in the old world and the new.

"The building will be adequate for all needs of the department for decades to come. It is so planned, however, that it can be indefinitely enlarged without sacrifice of symmetry or beauty. Moreover, the greatest elasticity will mark the interior plan. The framework is of steel, the floors are independent of the interior walls, and flues for furnaces, hoods, heating and ventilation are provided in large number.

ver mill. On the second floor, opening from the gallery of the memorial vestibule, will be two lecture rooms, one 40x42 feet, the other 24x42 feet, and private study and drafting room for the dean. On the third floor will be a library and stack room, and attic rooms for drafting, photographic work and other purposes. Adjoining each lecture room or laboratory will be a private study for the instructors.

"The aim has been to give expression to the character of a college of mining engineering," says Mr. Howard, "as distinguished from one of art, letters, or of natural science. The expression of helles lettres in architecture demands a more purely classic character than that of scientific studies. Such a building as a library, for instance, may without inconsistency rejoice in all the sumptuous glories of Roman architecture or the Renaissance. The tradition of the world leads one naturally enough in this direction. But the architect conceives that such delicate and highly organized motives find little place in a mining building, which demands a treatment, while no less beautiful, much more primitive—less elaborately developed in the matter of detail, less influenced by the extreme classic tradition either as a canon of proportion or as an architectonic scheme. The profession of mining has to do with the very body and bone of the earth. Its process is a ruthless assault upon the howels of the world, a contest with the crudest and most rudimentary forces. There is about it something essentially elementary, something primordial, and its expression in architecture must,

ter memorial and more lasting than the pyramid that Cheops reared; better, because it stands to help the life of men toward better things; more lasting, because it grafts itself upon the richest, warmest blood of the generations, and looks toward fruitage in the life of all the days to come. And the measure thereof no man can reckon. Here let it stand to tell of a virile character that struggled with nature and rude beginnings, and struggling won; but blended in the message must ever lie the reminder, though she wills it not, of a gentle woman whose thought went forth unceasingly toward others and others' good."

At the conclusion of President Wheeler's address the cornerstone was placed in position. As the cornerstone was lowered Mrs. Hearst said:

"The cornerstone is laid in honor of an earnest student of mineralogy, a practical miner—a man who measured men by their truth and methods by their honesty. It is our sincere hope that the department work of the Hearst Mining Building will add to the world's scientific and practical knowledge and that students may be here inspired to realize the highest ideals of labor."

Several articles were placed in an appropriate receptacle in the stone, among them a copy of the MINING AND SCIENTIFIC PRESS of the issue of Nov. 15, 1902.

The special photograph of the outer plan, as engraved and presented herewith, gives some idea of the appearance of this latest and newest American mining college when completed.

MINING AND SCIENTIFIC PRESS.

ESTABLISHED 1860.

Published Every Saturday at 330 Market St., San Francisco, Cal.

TELEPHONE, DAVIS 771.

ANNUAL SUBSCRIPTION:

United States, Mexico and Canada.....\$3 00
All Other Countries in the Postal Union.....5 00

Entered at the San Francisco Postoffice as second-class mail matter.

Chicago Office (Telephone, Harrison 73).....737 Monadnock Block.
Denver Office (Telephone, Olive 733).....606 Mack Block.

J. F. HALLOMAN.....Publisher.

San Francisco, November 29, 1902.

TABLE OF CONTENTS.

ILLUSTRATIONS.—The New Building for the Mining College, University of California, Berkeley, Cal. 304. Head Frame Flagstaff Shaft, Mt. Hope Mine, El Dorado Co., Cal.; Detail of Head Frame, Mt. Hope Mine, El Dorado Co., Cal. 309. C. M. Belshaw, Elected President California Miners' Association at Eleventh Annual Convention in San Francisco, Nov. 19, 1902. Take-up Device Attached to Indicator and Wheel; Penstock Unit Designed and Built by the Webster, Camp & Lane Co. for the Michigan Lake Superior Power Co., Sault Ste. Marie, Mich. 311. New Style Cummer Dryer, 312. Automatic Dump for Shafts, 313. Mining and Metallurgical Patents, 314.

EDITORIAL.—Capital and Labor Trusts; Objections Against the Metric System; Freight Rates in Mining Machinery; A Probability at Cripple Creek, Colo.; Mining Prosperity of the Country; Taxation of Mines, 305.

MINING SUMMARY.—315-316-317-318.

LATEST MARKET REPORTS.—319.

MISCELLANEOUS.—A New Mining Building, 304. Concentrates, 305. Electric Power for General Purposes in Mining and Milling, 307. Use of Crude Oil in Smelting; An Old Mining Property, 308. An El Dorado County, Cal., Head Frame; Formation of Nuggets, 309. Raising Gravel in Placer Mining; Cliff Climbing, 310. A "Take-up Device" for Indicators; Dry Crushing, with Direct Amalgamation and Cyanidation; The Tu-hine Equipment at the "Soo," 311. Deposition of Ore; New Type of Dryer, 312. An Automatic Dumping Frame for Shafts; Some Questions and Answers; Sinking or Tunneling, 313. Mining and Metallurgical Patents, 314. Personal; New Patents; Notices of Recent Patents; Commercial Paragraphs; Obituary, 319.

THE swiftness of mining progress in the West is exemplified in the case of Douglas, Ariz., a town of several thousand people, street railroad, etc., but not yet on the map.

A CHANGE from past custom is noted in the new policy adopted at the Massachusetts Institute of Technology, where it is intended that the head of each department shall be engaged in active professional work for commercial purposes, as well as being authority in his profession in the academic sense. It is experimental, but it is a move that must ultimately prevail in similar institutions, the general idea being that the best teacher can not be isolated from commercial activity.

THE inevitable discussion about capital trusts and labor trusts inevitably suggests the possibility of a trust in which capital and labor, employer and employee, combine to "cinch" the consumer. Whether it be lead or shoes, or coal or crackers, or zinc or putty, the rivalry of producers has tended to keep prices down, but should any industry organize a trust that embraced all the employers and employees in that particular industry the employers could pay any wage rate demanded and recoup themselves by passing the raise up to the consumer. The more skilled the industry the more liable this is to take place. The tendency is that way. When that does happen, then the consumers can organize a trust.

FREIGHT rates cut considerable figure in mining machinery sales in the various sections of the mining country, and many machinery manufacturers consider themselves cut off from certain territory because of existing railway tariffs. Chicago, Denver and San Francisco find that there is a constant tendency to decrease Eastern freight rates—west-bound rates are always lower than east-bound rates. On the Pacific coast prices on nearly everything are made by adding carload prices to freight rates. With Pacific coast ports, the ocean is a great factor in all freight arrangements; as to overland transportation San Francisco is at the rim of the wheel. With the ocean counted in, San Francisco, commercially considered, is about as near New York as Chicago is. Chicago has recognized facilities and advantages and Denver, by reason of its central situation and admirable railway system, also occupies a commanding position. Denver's great advantage lies in the fact that the railways recognized from the start the importance of the mining interests and threaded every canyon with connecting links of road, reaching throughout the entire State and connecting with all lines everywhere.

Taxation of Mines.

Now that elections are over newly chosen legislators who will represent the public next winter turn to thoughts of what to do, and what not to do. One thing that affects the mining industry everywhere is mine taxation. Many mining men annually feel a relief when their State or Territorial Legislature adjourns, because at least things are no worse.

There seems in some sections this year an intent to "go for" the miner in the way of new legislative enactments making even more onerous the present taxation. Probably the generally prosperous condition of the mining industry attracts attention and the idea is formed that anything doing so well ought to stand an extra "cinch." Idaho seems to have the idea that the gross output of the mines of that State should be taxed. That mining commonwealth also seems to think that a patented mining claim is fair subject for arbitrary assessment.

Colorado already has the system of output taxation, but seems to favor raising the rate and levying extensively on all mining machinery and improvements. Colorado has just sat down, hard, on the single tax idea, voting the Australian land tax proposition down on the 4th inst., but projects putting increased burden on the improvements.

Such restrictions and penalties violate the veriest A B C of wise government or just jurisprudence.

Montana seems to have a more fair system of mine taxation, a 3% tax on the net annual profits of mining. Nevada's former bullion tax, equivalent to a royalty on the gross value of the metal production, was productive of continual protest and friction. California's method is less open to objection. Arizona seems disposed to make mine development a penalty. Oregon and Washington cannot be said to have any system of mine taxation.

There is or should be recognition of basic difference between the taxation of mining property and almost any other kind of real or personal property—not to favor the miner, for the miner wants no favor—but justly recognizing existing facts. A man has \$100,000 worth of goods in his store; another has a \$100,000 machinery plant on his mine. It is manifest that the same general rule should not apply in both cases. It would be just as fair to tax a merchant or manufacturer on every dollar that passed through his hands in a year as to tax a mine owner on the mine's gross production.

A man has a \$50,000 farm, eternally reproductive; another has a \$50,000 mine, ephemerally so; the equities are dissimilar. Any system of taxation that tends to limit the number of workable mines is against public policy.

Freak assessments are occasionally noted, as in the case of the sapient Teller county, Colo., assessor who decided to assess on the valuation of what was represented by the mining stock quotations, the selling price of the stock to be the basis of taxation on the mine.

This thing provokes loss, litigation and delay and seriously affects the mining industry. It deters development, investment and general work. Take Cripple Creek district, Colorado! That is cited because it is to-day the most prosperous bit of gold-producing territory in the country, yielding \$2,000,000 in gold per month from a very small area. Yet the cinch taxation law of the last Colorado Legislature has had the effect of having Teller county report nearly 1500 mining properties in that district now for sale for delinquent taxes. The owners are willing to let their property go by default rather than submit to such extortion.

The present Colorado mine taxation law says in effect that a non-producing claim shall not be assessed more per acre "than is the lowest producing property in the same locality." Mining men are inclined in Colorado to naturally assume that that word "locality" means on the same hill, or in the same canyon, or, at least, in the same section of the camp, but the assessors seem disposed to interpret it as meaning only the next adjoining properties. So that as a result, even now, non-producers are in some instances assessed higher than are producing properties in what the owners claim is the same "locality."

Another question is the tax on unpatented mining claims. By a legal quibble regarding "possessory rights," the State presumes to tax United States property which is not taxable in or by any State.

The miner has no established title to the land, nor has the State. The United States Government does not grant to the locator any fee nor ownership on real or personal property. Yet the State assesses and taxes what the locator does not own nor the Federal Government grant. The only thing the locator really owns is the chance to make the property his own. Under this silly and baseless system an unpatented mining claim is "sold for delinquent taxes." But the State can give no title to property it does not own, nor can it work the property. All the State can do is technically deprive the prospector of his claim. All the prospector can do is to wait long enough, and when the ground becomes subject to legal relocation, locate it again. Then the State can assess him again, and when delinquent can "sell" the claim again, and after a while the prospector can relocate it again, and so on; a ridiculous proposition.

The matter is of importance to all miners. The intent of these fragmentary remarks is to suggest to newly-elected legislators, who propose introducing laws governing mine taxation in their respective commonwealths next winter, that a degree of caution is necessary and proper understanding of the subject absolutely requisite. The prospector should not be discouraged, the miner should not be frozen out, and the investor should not be unduly deterred from aiding development. The working miner is a good customer for everybody and a competitor of no one. He deserves a fair show and that's all he asks.

WITH the exception of a few frauds who have come to grief, this has been a prosperous year for the Eastern fakirs who prey upon popular ignorance and secure money from the credulous in exchange for worthless mining stocks. The general prosperity of the country and the prevalence of plenty of work at good wages have helped these fellows to swindle a good many out of money that the investors could poorly afford to lose. Some of the stories told are laughable. In Cincinnati, Ohio, one promoter who had an Idaho mining proposition of some merit was trying to sell some stock at 50 cents per share, but failed, as just ahead of him wherever he went had been an individual selling "mining shares" at 5 cents a share, and to the Cincinnati investor, to whom all shares look alike, it looked silly to pay 50 cents a share when he could get just as nicely printed shares for 5 cents. In Pittsburgh some enterprising mine "promoters" found their stock of slow sale, and concluded that they must own some mining property somewhere—it didn't make any difference where, but some showing must be made. Accordingly they bought a building lot on West Huerfano street, Colorado Springs, Colo., called it a "claim" and started again to sell stock, this time with considerable success, the money thus acquired "to be used for development purposes." A cellar was partially dug, and things went well till one Pittsburger happened to find out about the lot, and brought suit for recovery of the price of his "stock." The owners assert that they "refused \$50,000 for their claim." Doubtless that was so, as where there were two of them one could offer the other that amount and have it refused.

CRIPPLE CREEK, COLO., still reports as among the probabilities the merger of some of that district's big gold producers. It is asserted with some show of truth that Eastern men are financing the \$40,000,000 consolidation of the Portland, Gold Coin, Ajax, Mary McKinney and other producers, with the idea of effecting a saving of 20% in operation, dispensing with a number of men now employed in all capacities in and around the properties which it is proposed to "merge." Those who favor the plan say, however, that this is only "incidental," and that the main idea is to be able to meet and fight in any conflict that may arise in connection with other combines. The plan is possible, on the proposition that anything is possible, but it is extremely unlikely. E. J. Knight of Providence, R. I., who is chiefly mentioned in connection with the financial end of the alleged deal, is represented as saying that the matter is "sure to go through." It may—fall through. Economy is a good thing; so is fighting. But there are better things for Cripple Creek district than false economy or ill-timed factional quarrels. The deep drainage tunnel for that district is in the line of true economy, and is more worthy of encouragement than the combine scheme.

Concentrates

ALLOWING 20 cubic feet to the ton, one acre of ground 3 inches deep would contain 544 tons.

A BODY of galena in place one foot wide, 6 feet high, 6 feet long, would produce 16,582 pounds.

AT 100 feet piston speed a 10-inch duplex pump will deliver 800 gallons of water per minute.

LEAD at 4½ and silver at 49 is about the same as lead at 3½ and silver at 60 in the Idaho property.

FORTY-INCH pipe for hydraulic mining has been in use forty-five years. Forty-eight-inch pipe is not uncommon.

WITH an 850-pound stamp, the stem would weigh about 360 pounds; the head, 225; the tappet, 115; the shoe, 150.

A NINETY-POUND carboy of 50% acetic acid mixed with ninety pounds water will make 180 pounds 25% acid.

THE smooth surface of silver bricks is secured by burning sugar thereon while molten, briefly excluding the air.

GOOD steam coal will not contain more than 8% or 10% ash. It will take 10½ pounds air to burn one pound ordinary coal.

THEORETICALLY, the velocity of water per minute through a 9-inch pipe, 6000 feet long, 600 feet head, would be 785.4 feet.

GALENA and native copper are found in the gold quartz mined at the Apollo mine, Shumagin Islands, Unga, near Delarof, Alaska.

ANY assay melt that has carbon in the charge shows a tendency to puff, and the crucible two-thirds full will give more satisfactory result.

THE first electric light plant installed on shipboard in United States waters was on the steamship Columbia of the O. R. & N. Co., at San Francisco, in 1880.

A SINGLE-LACED BELT, 1 inch wide, will transmit 1 H. P. when traveling at a speed of 789 feet per minute; in the case of a double belt, 550 feet per minute.

THE Garrettson furnace was illustrated and described in the issue of January 21, 1899. Its recent use at the Crofton, B. C., smelter is not reported a success.

"THE present ratio of silver to gold" can be found as always by dividing the price of one ounce gold, \$20.67, by the present price of one ounce silver—49 cents—about 42 to 1.

CONTINUOUSLY, a miner's inch in twenty-four hours will discharge 2160 cubic feet of water. A flow of one cubic foot of water per second equals 50 inches under 4-inch pressure.

STEPHANITE (black silver) carries: Silver, 70.4%; antimony, 14%; sulphur, 15.6%. Silver glance is 87.04% silver and 12.96% sulphur. Chloride of silver (horn silver) fuses at 500° F.

A DOKIMASTIC TEST is understood to mean a metallic assay that is conducted under such circumstances and with such appliances and surroundings as to insure absolute accuracy in the announced result.

THE running time between San Francisco and New York City is 100 hours. The 985 miles between New York and Chicago is made in twenty hours. Steep grades necessitate slower time west of the Mississippi.

THE mere posting and recording of a claim to water confers no right upon the appropriator unless within sixty days after the notice is posted, construction of works is begun, "and diligently prosecuted to completion."

LOCAL conditions govern the use of water in a stamp mill: nine gallons per battery of five stamps per minute, and two and one-half gallons on the accompanying two concentrators per minute might be considered average requirement.

BY "free air" is meant air at one atmospheric pressure, 14.7 pounds to the square inch. An altitude of 6000 feet—barometer 23.83—would give an air compressor—theoretical standard 100% sea level—a comparative efficiency of 82.8%.

IF a volume of air at 60 pounds pressure, equivalent to 18,000 cubic feet per hour, at atmospheric pressure be passed through 1000 feet of pipes, the loss of pressure of air for 2½-inch, 3-inch, 3½-inch pipes would be 5½ pounds, 2 pounds, 1½ pounds, respectively.

TIN will amalgamate as readily as copper or silver. Before using perforated "tin" screens, the tin coating should first be burned off; otherwise the formation of tin amalgam would clog the discharge. On clean ore such a screen will last about thirty days.

THE theoretical horse power of a stream of water may be determined by multiplying the head or fall by the decimal 0.1136; this gives the value in horse power for one cubic foot per second; multiplying this result by the available number of cubic feet per second.

WITH moderately warm water mercury becomes more liquid, and in the clean-up amalgam from very fluid mercury has been found to retort higher. Amalgam that retorts up to one-third will sometimes change during the winter months under adverse circumstances to one-fifth.

REQUESTS for publications of the California State Mining Bureau should be sent to L. E. Aubury, Ferry Building, San Francisco, Cal. Similar requests regard-

ing Colorado should go to H. A. Lee, Capitol Building, Denver, Colo.; Montana, John Byrne, Helena, Montana, and Idaho, Robt. Boll, Blackfoot, Idaho.

THERE is no such thing as "non-assessable stock" under the laws of California. The stock in a corporation of any kind in that State is subject to assessments, and stockholders are responsible for the amount of assessments legally levied upon corporate stock held by them, any agreement to the contrary notwithstanding.

THE supreme court of the United States, in the case of Chambers et al. vs. Harrington (III U. S. 310), held "that when adjoining claims to mineral lands are held in common work for the benefit of all done upon one of them in a given year to the amount required to be done upon all in that year meets the requirements of section 2324, United States Revised Statutes."

TO DETERMINE the amount of air that can be produced by different size air cylinders, multiply the area of the cylinder by the stroke; multiply result by 2 if it is a straight line compressor; by 4 if a duplex compressor; or by 2 if a compound duplex compressor. Divide this result by 1728, which will give the amount of air per stroke, then multiply by number of strokes per minute.

WHERE there is a known quartz lode or vein included in a placer claim, an application for a patent thereto must state plainly that the placer contains such vein or lode; also must any notice published in a newspaper or posted. It must also be surveyed and marked upon the filed plat of the claim, and the field notes and plat must separately give the area of the lode and the area of the placer.

THERE is no authority of law for changing the courses of a patented claim, and surveys adjoining or intersecting such lines must be made to conform thereto. The land department is without jurisdiction or authority to correct any mistakes that may have been made in the surveys, as long as the patents remain outstanding. Nor can patent be lawfully issued for lands already patented to other persons.

NITRO-GLYCERINE is composed, chemically, of oxygen, 60.66; nitrogen, 19.91; carbon, 17.06; hydrogen, 2.36. It can be made by slowly dropping syrup of glycerine into equal volumes of nitric and sulphuric acid, mixed, and surrounded by ice, the stuff being strongly stirred after each admixture of the glycerine, but there are more preferable forms of suicide than any amateur attempt to make the stuff.

IN the Lake Superior copper mines the Calumet and Hecla ore carries 3% copper; Quincy, 1.5%; Tamarack, 1.3%; Osceola, 1%; Wolverine, 1.1%; Atlantic but a little more than one-half of one per cent. In Montana the Anaconda carries about 4½%; in Arizona the Copper Queen carries 8%; the United Verde 7%. In California the Mountain Co. carries 8%; the Boleo Co. of Mexico, 6%; the Rio Tinto in Spain, 3%.

IT has been repeatedly asserted that chloride of gold has been discovered in a natural state, but so far as "Concentrates" knows the assertion has not been fully substantiated. The nucleus of a nugget has been repeatedly produced from deposition of chloride of gold on iron pyrites. Where the solution of gold chloride is 4 grains to the ounce of water, the pyrites or other base begin to decompose, the iron sulphide changing to yellow oxide.

AMONG the causes of low efficiency in air compressors are the heating of the air during compression, mechanical defects in the inlet and outlet valves, and leakage past the piston. Inlet, when subjected to compression, is heated, and as the volume is thereby increased, much power is uselessly expended in dealing with the heated air. The most efficient compressor, therefore, in this regard, must be the one presenting the best cooling arrangement for the air as it is being compressed.

A CHEAP and reliable preparation for detecting counterfeit coins is: Test for gold—Strong nitric acid, 6½ drachms; muriatic acid, ¼ drachm, or 15 drops; water, 5 drachms. Test for silver—Twenty-four grains nitrate of silver, 30 drops nitric acid, 1 ounce water. Use the liquid as near the edge of the suspected coin as possible, as that is the part most worn. A drop of the preparation will have no effect on genuine coin, while it can be plainly seen on the counterfeit. Heavily plated coins should be scraped slightly before using.

EXPERIMENTS show that in a 2-inch steam pipe, 100 feet long and under eighty pounds pressure, the condensation amounts to 60.3 pounds of steam per hour when the pipe is bare and to 16.14 pounds per hour when covered. With steam at 100 pounds pressure, the condensation, when uncovered, reaches 72.20 pounds per hour. In a 10-inch pipe 35 feet long, carrying steam at 100 pounds pressure, the condensation, when uncovered, amounts to 112 pounds per hour, and when covered to but 15.93 pounds per hour. The temperature of the surrounding air ranged during the experiments from 50° to 75° F.

IN the ordinary construction of wire ropes the wires forming the strands are twisted to the left hand, but the strands are twisted to right hand, or opposite direction. In the "Lang lay" the wires forming the strands and the strands comprising the rope are all laid in the same direction. The average elongation of ordinarily constructed rope is about 3%, and with Lang lay 1½% to 2%. With holisting ropes the life can be increased by ordering

sufficient length to enable about 6 inches to be cut off the end occasionally, thus changing the point of lift or stress. A rope should be greased frequently and carefully with a good quality of lubricant, free from acids.

AT the plant of the Electrical Lead Reduction Co., at Niagara Falls, spongy lead is produced from galena. The galena is powdered and placed in lead. The pans are so arranged in nests that the bottom of each pan and the galena within act as a cathode and the under side of the pan placed above it acts as an anode. The electrolyte is dilute sulphuric acid. The hydrogen liberated at the cathode reacts with the galena as follows: $PbS + H_2 = H_2S + Pb$. The hydrogen sulphide and the oxygen set free at the anode are conducted away and converted into sulphuric acid. The spongy lead which results from the reduction is either pressed into plates for storage batteries or roasted to form litharge.

AS TO brushing battery plates it has been argued that final brushing be crosswise, i.e., at right angles with the course of the water, as it flows down the plates. Still, if say half of a set of plates be so brushed crosswise, and the other half lengthwise (parallel) with the running stream, if the battery stops running, the water continuing down the plates till clear, it will be often observed that the surface brushed parallel with the flowing stream is clean and well adapted to the adhesion of particles of gold passing out through the screen, while the portion brushed crosswise will appear dirty and discolored, the furrows being filled with minute particles of iron and sulphurets coming from the battery, only the summits of the little ridges being presented for the adhesion of the gold.

THE ownership of a mining claim of individual interests by two people does not make them partners. They are co-owners. Partnership is a matter of agreement. Co-owners, by an agreement, can form a mining partnership. If A, as a co-owner, bonds his half interest in a mining claim without consideration that is entirely his affair. The action of A does not bind B, who owns the other undivided half interest. If B bonds his half interest for a consideration, irrespective of the nature of the consideration, whether money or its equivalent in assessment work, the whole of it belongs to B, and he is not compelled to divide it with A. If the consideration was fifteen days' work, estimated to be half the amount required, it all inures to B's benefit, and A must perform the other half. The other half must be performed, too, otherwise the location becomes forfeit.

LANDS valuable for mineral are reserved from sale, except as otherwise expressly directed by law; and whether any certain lands are mineral or agricultural in character is a question of fact to be determined by proofs. While the right to a patent is equivalent to a patent issued, yet the purchase of lands containing minerals, under laws governing the sale of agricultural lands, does not vest any right, whatever, in the purchaser, for mineral lands are reserved from sale; and if no right to a patent exists, a patent cannot legally issue. No title from the United States to land known at the time of sale to be valuable for its minerals of gold, silver, cinnabar, or copper, can be obtained under the pre-emption or homestead laws or the townsites laws, or in any other way than prescribed by the laws especially authorizing the sale of such lands. Title to known mines does not pass with a patent issued under the laws regulating the disposal of agricultural lands. Land more valuable for its deposit of limestone than for agricultural is mineral land subject to sale under the mineral laws.

THE object sought in adapting briquetting to the smelting of fine ores is to obviate the loss ensuing from the escape of fine-dusts, concentrates, and granulated mineral fines during the smelting process, and to put the fine mineral ores, tallings, and similar fine materials into such a form as will admit of their being treated in the smelter without the loss which has heretofore resulted. Before briquetting was taken up as the logical solution of this problem by smelter-managers, considerable had been expended in experiments along many lines; but now many smelting concerns are operating briquetting plants for the treatment of fine dusts, and in many instances materials which for years have been running down the canyons or into settling basins are being carried back to the smelters, and after being solidified in the form of mineral briquettes are being resmelted with considerable profit. Through the treatment of these mineral fines, and of fine-dusts, and slimes from the concentrators, it has been found possible to increase the smelter output 10%, old ore-dumps and fine-dust containing as low as 3% to 6% of mineral value being treated by the briquetting process with much profit. In addition to these advantages, the briquetting industry as applied to fine minerals eliminates numerous disadvantages arising from the use in the smelter of concentrates and fine ores in their natural state. Aside from the establishment of many briquetting plants at the smelters, many mine-owners are erecting briquetting plants at their mines. The blast used in the smelter, while not nearly as strong as that used in a blast furnace for the reduction of iron ores, is still strong enough to force out a large quantity of fine ore in the form of fine-dust. In order to catch this fine-dust the gases and fumes from the top of the smelter are forced through long underground tunnels before they are finally emitted from the stack, and in this tunnel a considerable percentage of the dust is deposited. At intervals the tunnel is cleaned, and this deposit, after being treated by the briquetting process, is again sent to the smelter.

Electric Power for General Purposes in Mining and Milling.*

This paper deals with results obtained in Amador county, Cal., using electricity at \$6.50 per horse power per month, furnished by the Standard Electric Co. of California, generated at their plant at Electra, Amador county, from which about 14,000 H. P., of alternating current, is distributed through the central portion of the State. The transmission line along the mother lode from Angels Camp, Calaveras county, to the Fremont mine, $1\frac{1}{2}$ mile north of Amador City, carries a 10,000 volt current, which is transferred at each mine to 550 or 600 volts for power purposes and 125 volts for lighting purposes. At the Fremont mine the superintendent, C. E. Purington, has installed a 20 $\frac{1}{2}$ x24 duplex Ingersoll single stage compressor, capacity 1700 cubic feet free air per minute. The compressor is operated by a 300 H. P. general electric motor. The air is used for all purposes, hoisting, drilling and pumping water. The plant is only recently installed, so figures cannot be given accurately, but the superintendent informs me it is giving entire satisfaction. This plant is equipped with six air receivers of 1500 cubic feet capacity and several hundred feet 6-inch pipe for storage, besides the three steam boilers in which the air used (by hoisting engine) is reheated. This compressor has a unique unloader, being an automatically regulated valve in the pipe through which the compressor takes air, which valve is closed when the air pressure reaches any particular point it is set at. Of course, if the compressor sucks no air it pumps none, or practically so.

The Keystone Co. at Amador City saved \$150 per month using electricity at \$6.50 per horse power month, compared with water used under 185 feet fall at 20 cents per inch, formerly used in running this 40-stamp mill. They are now using compressed air for hoisting and drilling, the compressor being run by a 300 H. P. general electric motor with a 550 volt current. This plant is only recently installed. At the Kennedy mine a change from pine wood at \$6 per cord in the furnace to crude oil at \$1.50 per barrel was made. They found that \$17 worth of oil did the same work as \$24 worth of wood.

The article deals largely in compressed air plants, for with the exceptions when electricity is applied direct to mill rock breaker, blowers and pumps, compressed air, apparently, is the only resort, which accounts for its prominence in this paper, and as most mines are equipped with steam engines it is very easy to change from steam to air, as well as making it possible to fall back on steam in emergencies. As to electricity applied directly: Through the kindness of C. R. Downs, superintendent, and J. F. Phipps, assistant superintendent of the Bunker Hill mine at Amador City, Cal., I am informed that it costs them just one-half as much to run a No. 10 Buffalo forge blower by electric motor as by an upright steam engine, and much less care and repairs. The blower runs 1700 revolutions per minute, blowing 4000 cubic feet of air per minute through 2000 feet of 11-inch pipe at a cost for power of \$1.06 per day. This blower is run by a 10 H. P. general electric induction motor, consuming 5 H. P. per day; using steam it costs \$2.12 per day. Here they also have a 12x14 Ingersoll single stage compressor running 160 revolutions per minute belted direct to a 50 H. P. general electric motor, using air for drilling and pumping. Until recently all the pumping was done by steam at 100 pounds pressure, and I am informed that they see no difference in cost of pumping by air or steam; it is about equal, with the advantage of having the air to use for drilling when needed. However, I believe from my experience at the South Spring Hill that if the steam cylinder end of the pumps were large enough diameter to use at forty pounds pressure and keep up to speed, there would be a balance in favor of air against steam. They are paying \$6.50 per horse power month for electricity and \$6 for first-class pine wood in the furnace. This was proven very satisfactorily at the South Spring Hill where the pump running by compressed air was especially designed to work on air at forty-five pounds pressure, raising the water 725 feet vertically in one lift, the back pressure of the water at the pump being about 345 pounds to the square inch. This pump worked cheaper on air than it would by steam. Leakage and extraordinary heating of the air from compression make it advisable to use low pressure air whenever possible.

At the Oneida mine electricity is applied direct, a general electric 100 H. P. motor being geared directly to a Dow duplex plunger pump. This pump raises 200 gallons of water per minute, about 19 miners' inches of water, 1300 feet vertically in one lift through a 6-inch pipe for four and one-half hours daily at a cost of \$3.40 per day for power; at \$6.50 per horse power month 100 H. P. of electricity is used; the actual weight of water raised 1300 feet represents 65 H. P., so that there is a loss of only 35 H. P., or 35% in radiation on line from the transformer to the motor in the mine, friction in motor,

pump and pipe line, giving an absolute efficiency of 65%, which compared with steam or air is about three or four times as efficient, taking into consideration the amount of energy purchased.

W. R. Thomas of the Central Eureka informs me that it costs about one-half to run their blower by electricity as it formerly did by water at 20 cents per inch. When the water head is 500 feet or so I believe it to be about a standoff with electricity at \$6.50 per horse power month and water at 20 cents per inch for power purchased, with the advantage in favor of electricity by eliminating long and expensive ditch and pipe lines, with their constant repair, maintenance and delays due to breakage.

It is not necessary to cite other mines using electricity direct regarding its efficiency, and I desire to devote the remainder of this paper to the use of electricity for hoisting purposes, through the medium of compressed air. However, it seems very strange that a proper understanding cannot be had as to the feasibility of electricity applied direct to hoisting machinery.

The first essential to every compressed air plant is ample storage, so that a minimum size compressor can be used, running comparatively slow, and maintain the working pressure as nearly constant as possible. Air once stored can be used to-day or next week if properly stored. As to leakage, let me call your attention to this fact: At sixty pounds pressure air will travel through a pin hole at the rate of 600 feet per second, or 36,000 feet per minute, nearly 7 miles per minute, so however small the hole is the volume is large where a steady stream is blowing away. The same rule applies to the blowoff, so use an unloader of some description, preferably one that holds the outlet valves open, allowing the compressor to be in absolute equilibrium, forcing air into the receiver from one side of the piston and drawing it from the receiver on the other, and vice versa on the return stroke.

As to two or more stage compression I desire to call your attention. It is the ideal way to compress air, but so-called two-stage compressors are a farce, unless the intercooler is of sufficient size and proper design to return the air to something near the atmospheric temperature while it is passing from the low to high pressure cylinders. The term two-stage is used a great deal to sell inefficient compressors.

It takes power to run a compressor 60, 75 or 150 revolutions per minute even if it is unloaded, so plan the size of compressor and storage so that it runs unloaded as seldom as possible only in emergencies of idleness for comparatively long periods of the machinery using air. It is no more necessary to have the compressor running unloaded most of the time than it is to have steam blowing off continually because there is a blowoff valve on the boiler. With an induction motor and the alternating type of current used in this county it is not possible to start and stop the compressor to avoid blowing away air, so that must be accomplished by proper storage, unloaders, and more important than anything else, a proper size compressor, neither too large nor too small, so that the aggregate amount of air used in twenty-four hours will be furnished by the compressor running at a speed not to exceed 200 feet of piston speed per minute with the stroke at least double the diameter of the cylinder, for economical results. Heavy flywheels are more essential on a compressor than on a rock breaker, although generally not so considered, to prevent any jerking on the rope transmission or belt. In a 10-inch diameter compressor, at the end of each stroke the pressure changes when pumping against 100 pounds pressure from a hold back of 7854 pounds to a shove ahead of the same amount, and the air left there due to clearance runs the motor for an instant. A total change in tension on the belt or rope of 15,708 pounds, or nearly eight tons, a heavy fly is required to steady this motion, or it will jerk the life out of the belt or rope in a short time, as well as cause slipping. Avoid countershafts by a large diameter heavy rim flywheel on the compressor and avoid a tightener on belt driven compressors which takes power to run it 800 or 1000 revolutions per minute, by placing the motor far enough from the compressor, using a wide belt, so that the weight of the belt, with the slack side on top, will be sufficient to prevent slipping, which is another item of loss.

Now as to the efficiency of compressed air for hoisting engines, how can one expect air to be thoroughly satisfactory when the largest portion of power goes up the exhaust pipe, as well now and then it is all escaping through the blowoff on the receiver. I mention this because I have seen several plants doing this very thing and those in charge complaining about their compressor, or the electric motor, or some other reason, whereas the compressor is all right and a good, willing friend, likewise the electric motor, but the type of hoist and the storage and other things arranged by the superintendent himself are the only faulty things about the plant. Electricity and compressed air are a comparatively recent factor with which all miners must sooner or later familiarize themselves with, and when they meet this new factor with intelligence it will be as simple as hand drilling now is to the average miner. What would a superintendent say to his engineer if he continually had steam blowing off, or what would the board of directors say if there was a continual

stream of water running over the waste gate of the reservoir? Yet just such extravagance has been and in some cases is being practiced with compressed air. Treat it as economically and intelligently as you would water power, wood, fuel oil, and with the electric current at not over \$6.50 per horse power month it will be your best friend.

Receivers should be close to the compressors, and if possible, where the air is used for general purposes, run the air through an old boiler, submerged in water, which will compel the air, by cooling it, to drop what water is in it immediately and not drop it in the pipe line going down the shaft, so that it will not scour the pump cylinders and machine cylinders, as well as to a great degree prevent freezing at the exhaust, a common inconvenience. An old crosscut underground bulkheaded with concrete makes an efficient and at the same time large and cheap storage. Large piping and the absence of 90° elbows are very essential for economy. So much for the air plant; now for the hoisting engine itself.

Use double compound tandem engines; in other words, take an ordinary double cylinder hoist and add a low pressure of about twice the piston area of the present one, extend the piston rod through the rear head of old cylinder into the low pressure, and with the cut off added to the low pressure you have a double compound tandem hoisting engine. This allows starting the load with the two high pressure cylinders, instead of having to rely on the high pressure alone as in a duplex compound, with a high pressure on one side and a low on the other. Air does not condense like steam, so that the power in it is utilizable till it has expanded to nearly atmospheric pressure.

As to reheating air the cost is only trivial, for every twenty-four pounds of good coal or its equivalent in wood in reheating air at about eighty pounds gauge pressure an additional horse power for twenty-four hours can be obtained. Whereas, under good conditions, it requires from 96 to 120 pounds of good coal to get one horse power for twenty-four hours from steam, with first-class boilers modernly installed and operated. Using the steam boilers for reheating the air makes it possible to revert to steam in a few minutes at any time, in case of emergency, without loss of time.

In the MINING AND SCIENTIFIC PRESS of April 26th, this year, is a description of the plant at the South Spring Hill mine at Amador City, the planning and installation of which I had in charge. The compressor used is 10x18 duplex single stage poppet valve type, driven by a 30 H. P. general electric induction motor, and formerly run by water power. In this case the blowoff by use of an automatic valve arrangement at the air receiver was led into the steam boiler, so that unless the hoisting engine was idle there was no air wasted; however, considerable air was in this case allowed to blow away on account of the compressor not being equipped with an unloader. When the pumps and drills were not in operation all the air went to the steam boiler, there being reheated and used by the engine. The largest amount of wood used for reheating purposes was one-half cord per twenty-four hours. Under these conditions the cost of the power to operate the hoisting engines was reduced to one-half, a larger economy than has been made by oil, due mostly to the fact that forty-five pounds gauge pressure would haul the load, which means low pressure air. The compressor ran fifty-nine revolutions per minute, and furnished enough air to run two drills (3 $\frac{1}{2}$ x3 $\frac{1}{4}$ Rand), breaking sixty tons of very hard ore per day, hoist the same 550 feet, and about eighty tons of water per day with the use of one-half cord of wood. The average consumption of electricity was about 20 to 25 H. P. per day, the bills varying from \$135 to \$160 per month, and were more than covered by the wood saved as compared with running the hoist entirely on steam.

In milling not much needs to be said, as there electricity is applied direct. Electric motors put at least 90% of the power purchased into the belt, which, of course, discounts water or steam at prevailing prices. It is easily and cheaply installed, is a clean power, should not fluctuate, has a permanent speed regardless of hot boxes or bearings, either one stamp or all of them, can be hung up without an appreciable change in speed of the cam shaft. Concentrators can be started at will without varying the speed of others, giving a proper separation at all times, so that to the maximum extent possible, in a mechanical separation there is no sand in the concentrates nor any sulphurets in the tailings. Electricity is the miners' friend, and I trust that in the future, as well as now, those estimable gentlemen who are putting their brains, as well as capital, into these large electricity generating plants, will be working side by side with the miner, for the miner will always be their nearest consumer, and as one prospers so will the other. Mines and mills need no longer be far apart, thanks to our so-called electrical friends, and the advent of electricity, which travels with equal facility up hill as well as down, in sunshine or storm, unlike water, or teams, or railroads, and lays down at our very door, continually without interruption, ready harnessed for work, the greatest and most efficient power the world has ever seen, so that the miners can mine and mill on the highest mountain top as easily as in the valley, providing climatic conditions or the topography of the country do not pre-

*Read by JOHN B. TREGLOAN, Amador City, Cal., before the annual meeting California Miners' Association, San Francisco, Nov. 17, 18, 19, 1902.

clude it altogether. As to electricity direct for hoisting purposes, it should be taken up and fathomed, for its successful application is a very important economic proposition.

I desire to thank the various superintendents along the lode in Amador county for courtesies extended and data freely granted.

Use of Crude Oil in Smelting.*

Through your secretary, Mr. E. Benjamin, I received a request to prepare a short paper "On the Use of Crude Oil in Smelting." This I have endeavored to do, confining myself entirely to the practical side of the subject, and leaving the discussion of heat units, chemical composition of liquid fuels, combustion gases, etc., to our more scientific friends—the professors of the universities and technical schools.

Fuel oil for the generation of steam is not my subject, and you all are no doubt familiar with this problem. However, let me state to you, that at the Selby Smelting & Lead Co.'s Works, we use liquid fuel exclusively for the generation of steam—in Stirling water tube boilers, rated at 250 and 290 H. P., respectively. We burn an oil of from 26° to 27° gravity, and evaporate, per pound of oil, fourteen and a half to fifteen pounds of water, from and at 212°. This gives you a basis to figure the comparative value of oil with coal as a steam generator. Another way of getting at the comparative values of liquid fuel and coal is the following: In a large matting furnace of the reverberatory type, it is considered that one ton of coal should smelt about three and one-half tons of ore. I find that in the same matting furnace at Selby, I can smelt one ton of ore with one harrel of oil; this would give us three and one-half harrels of oil to three and one-half tons of ore; or, in other words, three and one-half harrels of oil are equal to one ton of coal. One ton of good coal is worth to-day in San Francisco, we will say, \$6. This means that one harrel of oil at \$1.71, or three and one-half harrels at \$6, would be equal in effective value to one ton of coal at \$6; and you all know that good fuel oil can be bought to-day in San Francisco for one-half of \$1.71 per harrel, and even less. In other words, you can save 50% and more by the use of liquid fuel instead of coal under the prevailing conditions and prices for coal and oil.

I wish to mention right now that I am not interested in any oil wells or oil stock, and am not attempting to hoorn liquid fuel.

The following metallurgical furnaces use crude oil at our works at Selby: Four roasting furnaces, with a total of eleven burners; one matting furnace, with three burners; one copper furnace, with one burner; fourteen lead furnaces, with fourteen burners; thirteen zinc retorts, with thirteen burners; three cupel furnaces, with three burners; one antimony furnace, with one burner; one furnace for melting fine silver, with one burner; total, 47.

In all of these furnaces the use of crude oil has brought about a saving of from 40% to 60% in the cost of fuel over coal. And this does not represent all the benefit to be derived from the use of liquid fuel in metallurgical establishments.

Let me quote you a few simple chemical reactions that you all are more or less familiar with, and which are of vital importance to all metallurgical institutions.

In the process of oxidizing sulphide ores, commonly called roasting, or desulphurizing, it is necessary that the atmosphere in the roasting furnace should contain as much free oxygen as possible to enable the sulphur in the raw material to oxidize or burn off in the shape of sulphur di-oxide (SO₂), and sulphur tri-oxide (SO₃). In using coal as fuel it is impossible to maintain this oxidizing atmosphere all the time, because, every time that fresh fuel is fed to the fire box, black gases can be seen to fill the interior of the furnace, and during this period of incomplete combustion, the process of roasting, or oxidizing, is absolutely at a standstill. What happens? A certain amount of fuel and time are wasted and nothing is accomplished.

Now look at the ideal conditions prevailing in the roasting furnace when liquid fuel is used. Once the flame is regulated, by properly adjusting the oil and steam inlets, we have a clear flame, with not a trace of soot in the roasting chamber; and this ideal condition continues for twenty-four hours per day, enabling the sulphur in the ores to combine with the oxygen in the air during every fraction of a second. This means that we can crowd a roasting furnace using oil far beyond the capacity of a furnace using coal, and still we can produce a good end roast with the same per cent of sulphur remaining. This means that we reduce the cost of fuel, labor and repairs per ton of ore treated. In all metallurgical furnaces where the aim is to oxidize, these same benefits are to be derived from the use of liquid fuel. I quote you, for instance, the cupel furnace, where the lead is oxidized to litharge, leaving the silver and gold on the hearth, or test, as dore silver.

But let me mention the matting furnace, of the re-

verberatory type. In this furnace the roasted ore is subjected to a white heat to produce a quick sintering and melting down of the charge. The aim in this furnace is to produce, first, "a copper-iron matte, which acts as an accumulator for the precious metals;" and secondly, "a slag which is formed from the earthy components of the ore." As matte is a compound of sulphur and heavy metals (mainly copper sulphide and iron sulphide) in fixed proportions, it is self-evident that the per cent of copper in the matte depends on the amount of sulphur remaining in the charge.

Suppose now that we use coal as fuel in the matting furnace, we will have a reducing atmosphere whenever the fireman gets busy and fills the grate with fresh fuel, thus producing an incomplete combustion for a certain length of time. During this period no sulphur can be oxidized by the oxygen of the air. With oil we have an oxidizing atmosphere during every second and consequently we find that we produce a higher grade copper matte in a furnace using liquid fuel than we can possibly produce in a furnace using coal. On the other hand, if it should be desirable to have a reducing atmosphere in metallurgical work, it is easy to change from an oxidizing atmosphere to a reducing one in an instant, by either choking the air inlet to the furnace, or increasing the flow of oil to the burner. This leads to the oil burner proper.

There have probably been 2000 patents granted for oil burners, each claiming remarkable and even most surprising results. For instance, some inventors claim that their burners will generate hydrogen. When asked to explain this, and how they expect to benefit the kind people by this most remarkable reaction, the usual answer is, "the heat decomposes the steam into oxygen and hydrogen; and there you are." In their eagerness to praise their burners they forget that plus and minus balance fairly well in nature, and that it would take exactly the same amount of heat to dissociate water into its component parts, namely, hydrogen and oxygen, as would be generated by combining or burning the oxygen and hydrogen so generated, minus a liberal amount of heat wasted by radiation.

When deciding to use liquid fuel, it is necessary to decide whether steam or compressed air shall be used as an atomizer. Let me call your attention to the fact that the use of compressed air necessitates a compressor, and an apparatus for preheating the compressed air. This latter appendix is very much to be recommended, because as you know, in allowing compressed air to expand the temperature of the surrounding air will be lowered. A cold or nearly freezing temperature will not be beneficial in atomizing liquid fuel preparatory to obtaining complete combustion. Steam, on the other hand, carries a certain amount of heat to the oil, and liquefies and even gasifies the same. Of course, all this pertains to plants on terra firma. On board a steamer it is different, where water has to be carried along, or sea water is to be distilled, in which case I should prefer to use air under pressure.

As the dimensions of metallurgical furnaces are variable ones, you will readily understand that we need flames of many different sizes for our metallurgical tools. For instance, at Selby, the extreme lengths of flames used are 8 inches and 6 feet. In the zinc retorts, which are our smallest furnaces, we need a flame of 8 inches. In the large matting furnace, 35x16 feet in the clear, we need a flame 6 feet or even more in length. The burner has to be adapted to the furnace and to the work to be performed. Hence you will find at metallurgical establishments a great variety of burners, or at least a great variety of sizes of burners, and I know of no better all-around burner than the one made of two concentric pipes, the smaller one being the oil pipe, and the larger one the steam carrier. By this arrangement the oil pipe is steam jacketed, and the temperature of the oil is raised to such a degree that its fluidity is very much increased, and part of the lighter oils become gases. All this tends to break up more or less the viscous oils into minute particles, which ignite readily when brought in contact with the oxygen of the surrounding atmosphere.

The following advice to future users of oil as fuel may not be amiss in concluding this paper:

First. By all means engage an expert to install your plant, and do not experiment yourselves, as it costs money to do so.

Second. Do not use a mixture of different gravity oils.

Third. Do not use a mixture of heavy residues with light oils from the oil refineries, as this mixture will not remain mixed. Oil refineries are very fond of mixing heavy residues with some light oils, thus producing an oil of the gravity corresponding to the one contracted for.

When making a contract for liquid fuel, insist that nowhere in the contract shall appear the words "fuel oil," but call for crude petroleum of a certain gravity, and insist, if possible, on getting the crude petroleum from wells producing very near the same gravity of oil. Suppose you contract for "fuel oil" of, say, 20° gravity; (and not for "crude petroleum") it is possible, and also probable, that you will receive a fuel oil of 20° gravity, but you will not always receive crude petroleum at 20° gravity. The refiner has a perfect right by this contract for "fuel oil"

and not "crude petroleum" to send you a mixture of residuum of, say, 10° gravity and a distillate of crude oil of 35° gravity in such proportions that the mixture will show 20° gravity. This mixture will be pumped into your storage tanks, and in a very short time you will find lumps as big as 10 inches to 12 inches in diameter; and on top you will find the light oil, or distillate. These lumps, which the refiners term B. S. (I refer you to them for an explanation of this, to me an entirely new and unknown chemical formula), will enter your pipes and burners, and will stop your oil's system up very effectively. Another point that should be observed in making contracts for crude petroleum is the percentage of moisture and grit allowed in the oil. Two per cent is a liberal allowance to be made to the seller, and if the crude oil contains more than 2% water and dirt, a proportionate deduction should be made from the oil received.

A very simple test for the determination of the grit and water in the crude oil is the following: Place in a graduated tube .01 cubic centimeter of the oil to be tested; add to this .01 cubic centimeter of gasoline; shake this mixture well and let it remain in a fairly warm place for twenty-four hours. By counting the cubic centimeters that represent the water and grit, which are easy to be distinguished from the oil, you have the percentage without any figuring.

During the last few years I have been repeatedly approached by parties asking me why I do not use oil in the blast furnace, and the only answer I can give them is the following: Solid carbon plays a very important role, especially in the upper level of the blast furnace shaft. Its function, especially with the fine ores, is largely to liner up the charge and allow the flow of gases to penetrate the charge evenly; besides, incandescent carbon has certain functions to perform in the blast furnace, which are of a chemical nature, and which need not be discussed in this paper. If coke or charcoal should be entirely replaced by oil in the blast furnace, the blast furnace charge would very likely become too dense to allow the combustion gases to escape freely. Besides, it seems to me, there would be considerable danger from explosions, if oil should be used as a fuel in blast furnaces. However, I think it may be possible to replace part of the solid carbon fuel with liquid fuel, but am not prepared to state at this time what percentage of liquid fuel could be used, or what mechanical arrangements should be introduced for the use of liquid fuel in the blast furnaces.

An Old Mining Property.

Probably the oldest mining property west of the Mississippi river is the Mine La Motte, which comprises several thousand acres in Madison and St. Francois counties, Mo. It was a French grant made in 1717, title to which was confirmed by Act of Congress to its then owners in 1829. The mine took its name from M. de la Motte Cadillac, French Governor of Louisiana, who conducted an expedition into the country south of St. Louis in 1715. The failure of the Mississippi company organized in France by Law led to the abandonment of extensive plans for the operation of this property, and the concession was ceded to the French Crown in 1731. For 150 years it has been a producer, the estimated annual production during the first fifty years being 100 tons per annum with the crude mining and smelting methods then in vogue. In 1819 the production had risen to 400 tons a year. In 1823 five lead furnaces were in operation.

Smelting on this property has been in constant progress for more than 110 years. Steam hoisting plants were first installed in Missouri at Mine La Motte. During the latter half of the century Mine La Motte's lead production increased heavily, being in 1870 as great as it was in 1901. Two years later a fire destroyed twelve furnaces on this property and the output was reduced markedly, four years later having touched 2914 tons. During this same period nickel and cobalt ores were first utilized. In 1892 the property yielded 4403 tons of lead—all from the surface workings—gophering.

The ore consists of sulphide of lead associated with sulphides of nickel and cobalt, and is interspersed with sulphides of iron and copper. The ore is disseminated through magnesian limestone, few fissures of value having been developed, and the deposits being cut out for considerable areas from each shaft. An electric drill plant is operated, the ore being trammed to a mill of 110 tons daily capacity. A smelting plant of three calcining ovens, one large and one small smelting stack and one refining furnace is in operation. A power plant of ten hollers and engines, three diamond drills and a complete system of water works are included in the mine equipment. Considerable deposits of disseminated lead have been proven with diamond drills, and the annual output of the property for the past few years has averaged from 2250 to 2500 tons of pig lead. All the nickel and cobalt produced in the United States last year came from this property, the matte being refined in New Jersey.

*A paper read by A. VON DER ROFF, Superintendent Selby Smelting & Lead Works, at the Convention of the California Miners' Association Nov. 17, 18, 19, 1902.

An El Dorado County, Cal., Head Frame.

Written for the MINING AND SCIENTIFIC PRESS by C. H. WILDMAN.

During the summer a new head frame was erected over the Flagstaff shaft of the Mt. Hope mine in El Dorado county, Cal., of which the following is a description:

The frame is of a modified A type, so designed that all the timber members are in compression, and tensile

down to the counterweight. This weight is a strong box, with an iron bale, and loaded with rocks until heavy enough to raise the door.

With the sliding rod in its normal position, the counterweight hangs at its lowest position, the door standing nearly vertical, the rope from it supporting the counterweight. As the idler rises with the bucket, when about 4 feet from the top of the head frame, the hook engages with the bend in the sliding rod, and lifts the latter along with it to the end of its trip, when idler and rod are supported by an automatic chair.

The result of lifting the rod is to lift the counterweight; the door, no longer supported, falls shut. With the idler on its chair, the bucket can be lowered, the door remaining closed. After dumping, the engineer raises the bucket until the clamp on the cable lifts the idler; the chair is withdrawn by a pull on a lever hanging at his hand. Then as the bucket and idler descend together, the counterweight also descends, raising the door in time to allow the bucket to pass down into the shaft.

This simple arrangement saves the usual labor of lowering and raising a heavy door by hand, and saves considerable time on each trip, and has proven altogether a convenience during sinking. No reason is known why it may not prove equally efficacious after a bin and self-dumping skip are installed.

Some changes would improve the working, such as using a square rod to prevent accidental rotation, which occasion-

Formation of Nuggets.

Written for the MINING AND SCIENTIFIC PRESS.

It has been stated that the presence of fine gold in fine gravels and coarser gold in coarser gravels may be due to the interstices in the gravel acting as a screen. It is not improbable that another theory might fill the conditions and offer a better explanation. May not the particles of gold of different grades of fineness have been made up of the smaller grains by agglomeration under the slow movement and pressure of the gravels?

If it is admitted that the gold was originally in solution, and, after finding its way into the gravel, was reduced to the metallic state by organic or ferruginous materials, why should there be any variation or such great differences in the dimensions of the grains? Why should not all be of the same size, or approximately, excepting such portions as become crystallized, which is not unusual in gravel gold. There is much that Nature performs in her laboratory which we cannot repeat in ours; the elements of mass and time are beyond our reach, but we know that precipitation generally—and of gold by organic and iron compounds in particular—results in an impalpable powder. It is conceivable that an excessively slow precipitation might result in crystalline forms, if such should take place from a saturated solution. It is also easy to conceive of conditions obtaining where the resultant of the precipitation found lodgement in cavities or cracks. Such being the case, by what process did the minute grains of precipitated gold become "fines" and "flakes" and the "flakes" become "coarse" and nuggets?

If two freshly cut, plane surfaces of lead are pressed together, they will cohere; if the pressure is increased, and a twisting, rubbing movement be given to the lead surfaces, the cohesion will be even better. It is necessary that the surfaces should be bright, with no oxidation.

Gold for dental work is superior to all metals,



Head Frame Flagstaff Shaft, Mt. Hope Mine, El Dorado County, Cal.

stresses are met by iron tie rods. For part of these a lot of old $\frac{5}{8}$ -inch iron cable was used, rove through eye-bolts, threaded to give the desired tension.

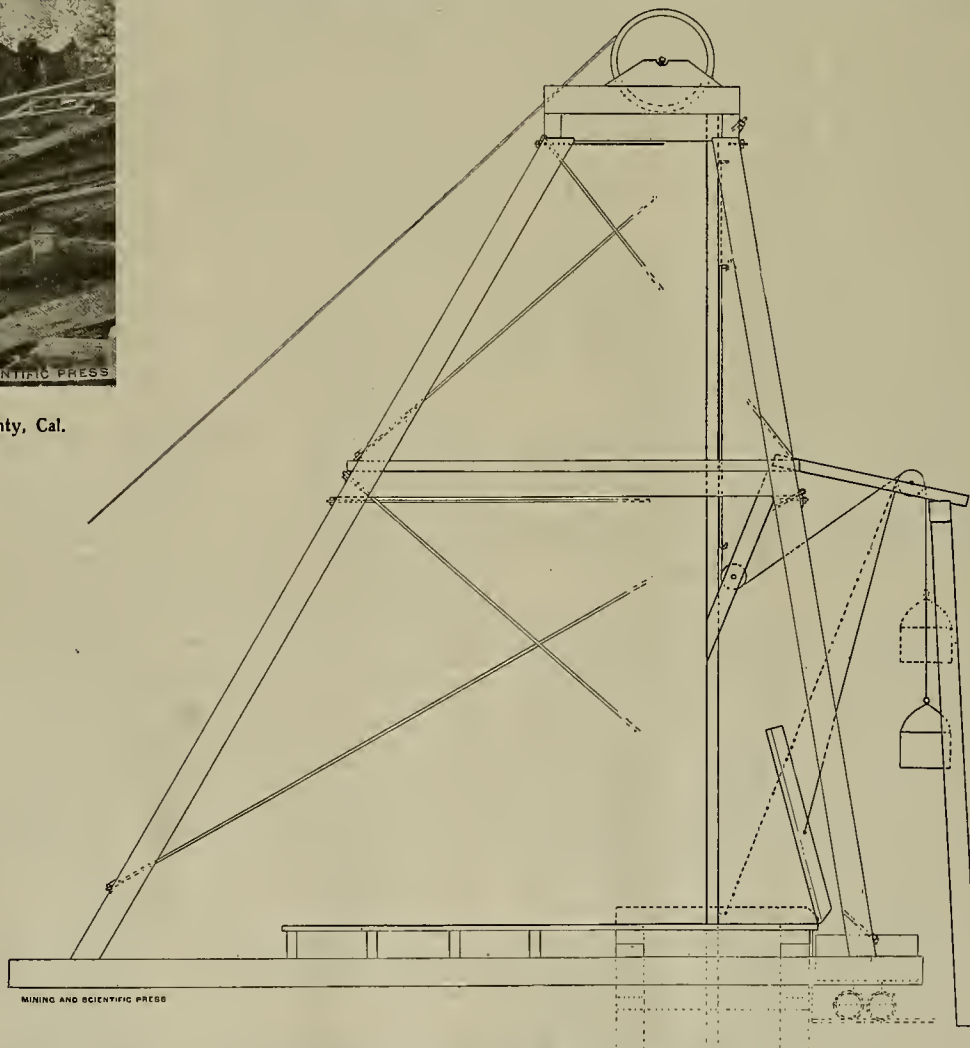
In place of tenon and mortise joints, dowels were used, made of 1-inch gaspipe cut in 3-inch lengths. Two of these, separated 6 inches to prevent rotation of the members, were used at each joint. This proved a quick and very satisfactory method of jointing, the amount of wood cut away being reduced to a minimum, and the cutting being of the easiest character—simply boring shallow holes with an expansive bit, for a driving fit. The holes were treated with coal tar to prevent decay around the dowels.

The frame has been roofed over the sheave, and on the upper parts of the sides, in the directions from which most of the stormy weather comes.

A clear height of 24 feet above the platform is secured; the intention being, when drifting and stopping are resumed, to put a receiving bin in front of the head frame, using a self-dumping skip.

During sinking an idler runs on the guides, carried about 6 feet above the bucket by a clamp on the cable. The cable runs through a hole in the idler, so that when the latter is resting on its chair, either at the top of the head frame or bottom of the guides (which are kept about 30 feet above the shaft bottom during sinking), the bucket can be lowered for dumping or loading.

The idler has on one of its upper corners a hook that projects alongside of one guide and just clears the shaft timbers. A bar of 1-inch round iron, about 9 feet long, with a hook at the lower end and a horizontal return bend at the top, slides up and down in iron guides along the outer corner of the shaft guide, near the top of the head frame. From the hook at the bottom of this rod a $\frac{5}{16}$ -inch wire rope passes down around a small sheave, thence up and away from over the shaft, around a second sheave, and down to a counterweight. Over the shaft is a door, hinged above the car-track, so that any dirt spilled on the door in dumping may fall into the car as the door rises to allow the bucket to descend. From a point about 3½ feet from the hinge, another wire rope runs up and over the second sheave, and



Detail of Head Frame, Mt. Hope Mine, El Dorado County, Cal.

ally leaves the rod in such a position that the hook on the idler fails to lift it. A strong, coiled spring at the point where the rope is attached to the door would reduce any jerk from rough handling of the hoisting engine. As the idea was new to the designer, it was a matter of cut and try and elimination of errors as they were revealed.

For a shaft where a door is necessary to protect the miners working below, this is a very convenient arrangement.

chiefly, if not entirely, by reason of this property—coherence. Gold will not oxidize.

It does not require much of a stretch of the imagination to see the analogy, and from which the conclusion can be drawn, that the grains of coarser gold and nuggets have been formed from the original metallic precipitate by the agglomeration of the minute particles, assisted by the pressure, the sliding and rolling, but slow movement of the gravel and boulders. In the finer and less massive gravel, with its smaller interstices, is found the finer and but slightly ag-

glomerated grains; among the coarser gravel and boulders are the coarser gold particles and nuggets. Part of this may obtain by the screening effect of the various sizes of the gravel, even though the interstices of the coarser gravel are generally filled with the finer material.

The conclusion, therefore, would seem to be that the finer gravels, by reason of the smaller mass and surface areas of the grains, agglomerate but a small portion of the grains of gold; and the agglomerated particles increasing in size as the surfaces of the gravel increase, take in, so to speak, a greater portion of the already increased gold particles. The increased coarseness of the gravels and consequent slower movement and grinding effect and the contact with more gold increase this agglomeration until "coarse" and, later, nuggets of increasing size are formed, as a snowball becomes a large mass after a trip down the hillside.

A not unusual feature in large gravel nuggets is a seam or faint line along one edge as if the gold had been folded over in the rolling and grinding operation, the folded surfaces welded together, the line showing the welding joint.

Raising Gravel in Placer Mining.

Will you kindly state in the MINING AND SCIENTIFIC PRESS whether centrifugal or other pumps are successfully used for raising gravel in placer mining.

Any information on this line will be much appreciated by me, and I have no doubt by other readers also.

Boston, Mass., Oct. 30, 1902.

C. A. PARSONS.

In answer thereto, Jno. Richards says:

In reply to Mr. Parsons' inquiry would say centrifugal pumps made for the purpose are suitable for raising gravel after it is quarried or disintegrated, the latter being the main process in working underground strata. There is no impediment in "raising" the gravel when it is delivered to the pump and has been passed through a grizzly or screen that will arrest boulders larger than two-thirds the diameter of the pipes. Pumps for this purpose should be of the triple-vane type to avoid scum on the sides, also to prevent sand from passing outward into bearings and around inlet nozzles. The passages are, of course, different from a water pump. Gravel is much easier to pump than sand, especially fine sand, which is liable to form a compact annulus in the pipes. Present practice here is extensive and successful, but one cannot well advise your correspondent without knowing the conditions under which the machines are to operate. Raising gravel is a comprehensive term. If auriferous gravel mining is meant, it is better to dig it and raise it at one operation by bucket dredgers, delivering it high enough to permit washing, as in the case of the machinery made by the Risdon Iron Works of this city.

San Francisco, Nov. 8, 1902. JNO. RICHARDS.

As is often the case, and as Mr. Richards points out, exact details are necessary to furnish exact reply. Possibly what Mr. Parsons refers to is what is sometimes called "pump dredging," though the term "pump dredger" is somewhat of a misnomer, since the machines do not work by dredging. The process consists of hydraulic sluicing, the necessary pressure being given to the water by a powerful centrifugal pump. The water and the gravel which it breaks down gravitate into a suction well or sump in the lowest part of the workings, and from this they are raised by another centrifugal pump and delivered into sluice boxes at a height of about 50 feet from the floor of the excavation. The bottom of the sluice box is fitted with the usual riffles, which retain the gold, while the water, carrying with it the gravel, flows over the end of the box to the dump. The machinery is all fitted on a pontoon so that it can be floated to a fresh position when desired. When work is about to be commenced on a deposit, and excavation is made of sufficient size to accommodate the pontoon, the water is allowed to accumulate in this and the dredger is launched. The excavation is then drained by means of the centrifugal pump, so that the pontoon can rest on the bottom, and the bank gravel is worked away by hydraulic sluicing. When the excavation has been so much enlarged that the shifting of the dredger is desirable, this is effected by letting in the water and floating the pontoon to the most convenient position for continuing the work. The pump dredger has advantages under certain conditions. Thus, where the bedrock consists of hard and uneven rock, it would be difficult to obtain the gold lodging in the crevices other than with the so-called pump dredger. Where a deposit of gravel exceeds 50 feet in depth there should be nothing to prevent its being successfully dealt with by the method of hydraulic sluicing and elevating. When the question of cost, however, is considered, the comparison is in favor of bucket dredgers, which can be worked by two men per shift of eight hours, while the pump dredgers require eight men per shift. Moreover, as much more powerful engines are necessary for the pump dredgers, the consumption of fuel with these is greater than with the bucket dredgers. In the case of deposits of gold river gravels of moderate depth, resting upon soft bedrock, the bucket dredger is deemed the cheapest and most efficient appliance for recovering the gold; where the deposits

are of great depth, or the bedrock is too hard and uneven to allow of the employment of bucket dredgers, pump dredging could be successfully employed, provided the gravels be sufficiently rich to cover the extra cost.

There is a gravel pump method in use in West Australia, which in a general way may be described as follows:

The system consists first in excavating a portion of the gravel to be worked down to bedrock, which may be 10 feet, 15 feet or 20 feet in depth, as the case may be; the bedrock is then levelled, and upon this spot is constructed a wooden barge 30 to 40 feet square, according to the size of the plant, and 3 to 4 feet high, constructed to withstand the vibration and weight of powerful machinery. Upon the deck of this barge is installed the plant necessary for breaking down the alluvial banks and recovering the gold therefrom, consisting of a boiler and horizontal engine, ranging as high as 180 H. P., two centrifugal pumps, 12 to 14 inches, placed on either side of the end of the barge, facing the drift; these pumps work on the one shaft, and are connected by beltting with the driving wheel of the engine; the right-hand pump is the gravel pump for carrying the alluvial to the sluice boxes, the left-hand pump supplies the force of water for the giant nozzle. A suction pipe leads down from the gravel pump to a sump or well below and near the end of the barge from the same pump, a delivery pipe leads up to the sluice boxes overhead which stand on trestles at a height regulated by the depth of the gravel to be worked, and having a grade of about 1 in 20. These boxes are usually of iron, 3 to 5 feet in width and about 100 feet long, fitted with diamond riffles at the head, followed by punched or slotted steel riffles. Mercury is spread down the boxes. The gravel pump contains a hard cast-iron liner, likewise the hollow fan, which revolves inside the drum, both these can be removed when worn through; in some ground, hard angular stones of great size will wear a liner out in six weeks, but in better ground will last twelve months. Attached to the nozzle pump on the left is a pipe leading to the giant nozzle, and another suction pipe leading to a second sump on the left-hand side of the barge, where the returned water is received. On starting work the water from the creek or reservoir is allowed to flow into both sumps, the suction pump drum is primed by means of a jet of steam displacing the air and the machinery is set in motion, with the result that the water from the nozzle pump is discharged against the gold-bearing drift, washing it down the gutter to the gravel pump sump, its force being equal to 75 or 100 feet head. Water, gravel and gold are then carried by the power of the gravel pump through the discharge pipe to the sluice boxes overhead, the tailings falling at the end of the boxes and forming a mound. The water separates out, and is conducted back to the nozzle pump sump, and so forms a circulating motion, with the exception of the loss by soakage.

Two important points which require further explanation are, the elevation of the sluices to such a height, and the construction of the plant on a barge. The elevating of the sluices allows the tailings to fall behind in the form of a ridge or mound, and by the time the mass of tailings have reached inconvenient proportions, the working face of the drift has receded a considerable distance from the barge, and then the discharge pipe is disconnected, the suction pipe raised, the water allowed to accumulate in the worked-out ground, and the barge with its burden floated up to a new position and work re-commenced. Thus flat or gulch when worked out leaves a series of undulating mounds of worthless tailings behind to mark its track.

A plant such as described is figured to be capable with a 12-inch gravel pump of lifting 60 to 80 cubic yards of gravel ground to the sluices every hour, and to require but four or five men a shift. Work proceeds night and day, incandescent and arc lights being used at night time. Large areas only worth four or five grains to the yard are there worked at a cost varying from 5c to 12c per cubic yard, according to the nature of the bedrock. This is solely as to the pressure for the giant nozzle and the deposition of the tailings. Regarding the water supply, assuming that there is a large area to be treated, the first step would be to bring sufficient supply of water which would necessitate excavating an immense tank; then in addition to the supply of water in the tank at the natural water level, the supply is strengthened by running trenches from the main tank far into the lake; the next step, erecting a pumping station as near the tank as possible; next, laying suitable pipes from the pumping station to the ground. To ensure a plentiful supply on hand, it would be necessary for these supply pipes to terminate at a main reservoir, which should be situated on the most advantageous part of the ground, in order to command the works, and shall not be less than 100,000 gallons. As regards the installation of the barge and machinery already described, care would have to be exercised that the starting point was on lowest portion of the ground in order, as the work proceeded, to give a slight fall towards the suction pipe. Eight to nine-inch pumps should answer the requirements on this field; but this would be regulated by the water supply. Should it be found that the salts in the water corroded the water supply

pipes in spite of a coating of asphaltum, this difficulty could be got over by having the supply pipes constructed of wood instead of steel. An 8 to 9-inch gravel pump would be capable of dealing with about 35 cubic yards per hour, and would require about 40,000 gallons of water to treat the material running over the sluices during one hour. In order to keep the gravel and nozzle pumps constantly at work after the main reservoir was filled, a pumping plant at the lake would be required capable of supplying 16,000 gallons per hour, and by returning the water in the manner described this would give the quantity required, after allowing the loss of one-third for soakage. Having the reservoir full, work could be carried on for several hours in the event of anything going wrong with the water supply plant.

Cliff Climbing.

Every cliff is climbable in some way, as Prof. Lihney has proved at the "Enchanted Mesa" in New Mexico, but not every cliff is to be climbed by ordinary methods, or with muscular effort unaided by mechanical contrivances. Yet few cliffs are as steep as they look to be, and many "inaccessible" places, so called, can be scaled by the means of good judgment and a cool head. The author was told that the walls of a certain canyon had never been climbed by man, at a time when he had climbed it in three places and had carried a gun up one of them. Looking from below, all slopes appear exaggerated, and the little inequalities of the rocks that afford support to hands and feet are invisible.

There is a great difference in cliffs of different sorts of rocks in regard to the facilities afforded to the climber. Limestone is much the best in this respect. It wears to a rough surface, it breaks in angular chunks and it does not crumble. Besides that, the limestone frequently occurs in beds of varying hardness, and these result in shelves along the face of the cliff, which greatly facilitates cliff climbing.

Granite cliffs are inferior to limestone for climbing. The surface is smoother, it crumbles more and different parts of the same cliff may vary greatly in these particulars. Sandstones are difficult to classify as a whole. Some of them nearly approach the limestone in firmness and reliability, while others are as crumbling and as dangerous as rock can be. The softer rocks seldom form cliffs, and a wall which is firm enough to withstand the assaults of the wind and rain is usually solid enough to bear the extra strain of a man's weight.

Cliffs of the harder volcanic rocks, such as basalt and obsidian, are seldom to be climbed. The surfaces are smooth and hard and the slope is often truly vertical.

The best and the safest climbing is upon bare rock which is absolutely free from anything else. This is a reason why cliff climbing is nowhere to be followed with greater pleasure and safety than in the Rocky mountains. Whatever appears upon the face of the cliff apart from the main mass of the rock wall should be regarded as a delusion and a snare. Loose rocks, gravel, grass, bushes, roots, branches of trees, moss and even moisture upon the rocky surface add immensely to the difficulties and dangers of an ascent.

Falling timber adds very greatly to the danger. It is impossible to tell how firmly a trunk is rooted or how much weight will upset its balance, except by actual experiment. After the experiment the knowledge is useless.

Many of the dangers supposed to be inseparable from cliff climbing are the result of improper clothing. Anything that will catch on the rocks or that will impede the free movement of the limbs is of course to be avoided, while the ordinary shoe is about as bad for the purpose as anything that could be devised. What is needed is something that, while protecting the foot from the rock, will adapt itself to all inequalities and give a firm support without slipping. The nearer the shoe approaches the conditions of the naked foot the better it is for climbing purposes. In case of danger it is a good rule to remove the shoes entirely. An observance of this rule once cost me a 2-mile walk, stocking-footed, over the pebbles, but that was better than lying at the foot of the cliff indefinitely. The only thing I regretted was that I had no more sense than to throw my shoes to the bottom of the cliff, where they are yet, instead of tying them about my neck as I should have done.

In cliff climbing, as well as in mountain walking generally, it is a bad plan to depend on toes or heels. It is the sole which is intended for walking and climbing, and it is the best, the surest and easiest for the purpose. Besides it doesn't wear out the shoes nearly so fast.

Cliff climbing is up-hill work. There is no science of climbing cliffs downwards, and there is not likely to be until a man gets eyes in his feet so he can see where he is going. There are a great many cliffs which can be easily and safely ascended, but whose descent is an alternative between a fall and a jump. It is a good plan in cliff climbing to come down some other way, and a very safe precaution to take before making an ascent is to make sure that there is another and safer way down. The most serious acci-

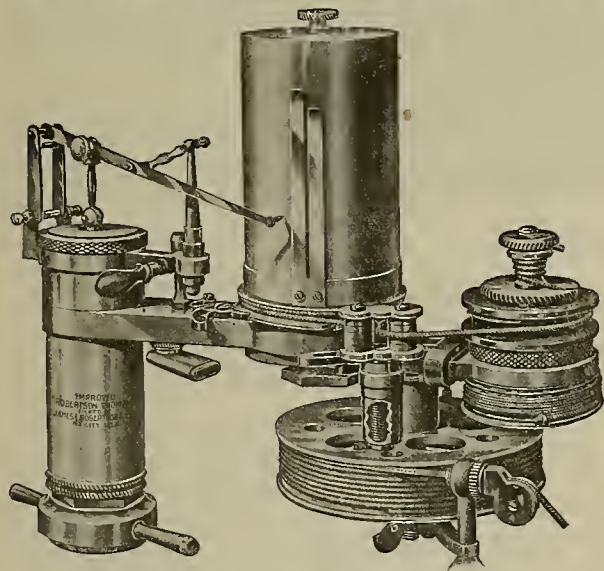
dent that I have known resulted from a lack of this precaution. A young man climbed to the summit of one of the cliffs at Cheyenne canyon, Colo., only to find himself on an isolated pinnacle of rock. To descend by the way he came was impossible. With great difficulty, and in deadly danger at every moment, he worked his way around to the opposite side of the conical rock, descending gradually, but finding no way to reach the level beneath. It was a long strain on muscles and nerves. The rock was so steep that a position could only be maintained by the use of both hands and feet, and the relaxation of muscles meant a certain fall. And end came with the gathering darkness. To stay through the night was an impossibility and aid was not to be expected. The only thing to be done was to diminish the inevitable fall as much as possible. He wrote a letter, placed it in his hat, and then started downwards. His last remembrance was of sitting and sliding towards the edge of the slope. The fall, as afterwards determined, was about 50 feet, though this was not a direct drop, but rather a sliding and rolling upon the rocks. When he regained consciousness the stars were shining and he was lying upon a gravel slope at the foot of the cliff. Just above and within reach of his hand were the branches of a spruce tree, which may have broken his fall. His clothes were badly torn and soaked with blood. He was generally bruised, scratched and cut. The worst injury was a compound fracture of the lower jaw, caused apparently by a blow from a projecting rock upon the point of the chin.

What good does it do? Cliff climbing is an amusement, like others. The chief object is not in the result, but in the doing. There are and have been professional cliff climbers, such as the cliff dwellers of early America and the hunters of Norway. An experience of cliff climbing is often useful in surveying and in prospecting for mines. But the amateur needs no other object than the pursuit of his purpose.

The chief charm in cliff climbing comes from the conquest of danger. That this is ever present, can not be denied; but with fearlessness and good judgment danger may be overcome and done away with.

A "Take-up Device" for Indicators.

The great trouble experienced when using the detent on the steam engine indicator is that of the slack given up by the cord between the paper drum and reducing bushing on wheel. This slack, if not properly guided when throwing on detent, is liable to foul, thereby in many instances wrecking the instru-



Take-Up Device Attached to Indicator and Wheel.

ment or at least breaking the cord, causing delay and inconvenience to the operator. The take-up device is presented for the purpose of doing away with such annoyance. It is simple in its construction and can be applied to any standard indicator.

It consists, as will be noted by reference to the illustration, of a short horizontal arm, at one end of which is a vertical bearing, in which sets a steel pillar on the upper end of which there is a frame holding a double set of loose steel rollers, between which the cord from paper drum passes. On the lower end of vertical pillars there is a light spiral spring inclosed. This spring causes upper frame to revolve when cord becomes slack, and is so arranged that cord winds on frame, to be given up when tension is applied.

The object of the device is to permit the operator to take as many cards as desired without unhooking from the crosshead or stopping the engine, no matter what speed. This of course pertains to indicators that are fitted with a detent and using a direct connected reducing motion.

Where an indicator is used in connection with pendulum, lazy tongs or reducing motion attached to engine frame, less trouble arises; generally a rubber band is employed to take care of slack



C. M. Belshaw, Elected President California Miners' Association at Eleventh Annual Convention, in San Francisco, Nov. 19, 1902.

cord, which works fairly well. In this case the take-up device is arranged in the shape of a regular guide pulley to connect direct to indicator, the guide pulley is removed and this put in its place, wound up and ready for use. It can also be used with satisfaction as a guide pulley if not needed to take up slack cord, as the little pulleys are arranged to let the cord run through with perfect freedom, and immediately the detent is engaged, it picks up instantly what slack cord takes place. The tension of the spring in this device, being so much weaker than the drum spring, soon as detent is disengaged, the cord is instantly released and drawn out taut and assumes its regular position.

The take-up device is likewise attached to engine frames and used in various other ways. It is strong, well made and compact and makes an attractive attachment. It is good for any number of revolutions and is designed to fit all standard indicators and reducing wheels, or it can be made as a special fixture. It is made by J. L. Robertson & Sons, 195 Fulton street, New York City.

Dry Crushing, With Direct Amalgamation and Cyanidation.

In a discussion of stamp mill work and ordinary amalgamation processes, John Yates, describing what may be styled the MacArthur-Yates method, says:

"After freshly dressed plates have been inserted in the frame, ore and cyanide of potassium solution, in the proportion of 2 to 1, respectively, are charged into the harrel together, the amalgamated plates being vertical. When the barrel has received its full charge of 2½ tons of ore and 1½ ton of cyanide solution of suitable strength, the charging aperture is closed, a tight joint being secured by means of a rubber washer. The barrel is then started, and is driven at about fifteen revolutions per minute for one hour, when it is stopped as quickly as possible by means of the brake, with the aperture uppermost, the cover is immediately taken off and the barrel given a half turn to discharge. The discharged harrel is then turned over to permit of the

amalgamated plates being got at. These are released by knocking out the wedges and are placed on a light tray, duplicate plates which have been dressed being substituted. The barrel is then ready for another charge. From the discharge casing the pulp passes by a launder to one of the percolation vats, each of these vats taking the twenty-five hours' output of the whole of the barrels, and the ore is subjected to a complete percolation treatment in them."

From the above description it will be seen that the process is, in the main, the ordinary cyanide percolation process, the distinguishing feature being that the ore is subjected to a short preliminary agitation, with the view of securing the amalgamation of as much of the gold as possible and thus raising the extraction.

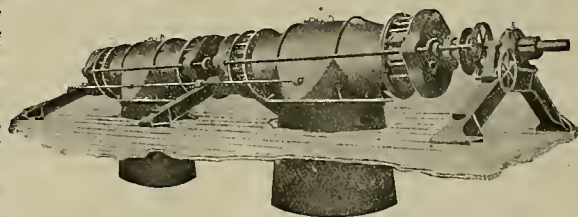
F. L. RANSOM of the United States Geological Survey, in his report on the "Deposits of the Rico Mountains, Colorado," cites the occurrence of two minerals new to Colorado—wollastonite, a silicate of calcium, associated with chlorite, epidote, garnet and other minerals, and halosite, a massive, clay-like mineral, essentially silicate of aluminum, occurring as alteration product in the Logan mine.

The Turbine Equipment at the "Soo."

The power station at the Sault Ste. Marie, which was put into commission a few weeks ago, is a large example of the application and development of water power from a low head. It took months of experiment and study before being perfected, and as installed has one point of advantage over the Niagara Falls equipment in the efficiency of the turbines. The type of turbine used in the Soo equipment is the McCormick turbine.

The usual method of setting turbines has been to place the wheels so as to revolve in a horizontal plane, the shafts being vertical. With the advent, however, of expansion in the electrical field, and the application of water power to the generating of electrical currents, it became necessary to set turbine wheels in a vertical position on horizontal shafts. When the Michigan Lake Superior Power Co. prepared its plans for the new power house this setting was finally determined on. Up to this time tests of wheels had been made on a vertical step at the Holyoke Water Power Co.'s flume in Holyoke, considered to be a reliable testing station, designed by Francis and constructed by Clemens Herschel. This type of flume was used by Francis to obtain his formulae for calculating water powers, which are authoritative. To make tests on wheels in a horizontal setting required considerable expenditures and an arrangement was finally entered into between the Power Co., the Webster, Camp & Lane Co. and J. & W. Jolly, Holyoke, to design, build and test a turbine unit which should fulfill the following requirements:

With a 16-foot head the unit must develop 568 H. P. at 180 revolutions with an efficiency of 80%, tests to be made at Holyoke under the supervision of Prof. G. S. Williams of Cornell University. After months of experimenting with improved forms of wheels and various designs of draft cases and draft tubes, the final design was adopted. The best results finally obtained were as follows: Head, 16 feet; speed, 180 revolutions per minute; H. P., 584; efficiency, 84%. These figures speak for themselves. The penstock unit as illustrated consists of four turbines arranged in pairs with one draft tube for each pair. Each pair is keyed to an open hearth hammered steel shaft and the two shafts are bolted together by means of forged couplings. The shafts are designed to transmit double the power of the generators with the usual factors of safety. This is to provide against the torsional vibrations caused by generating an alternating current. Each pair of the turbines discharge into a central conical ended draft case, and the discharge is continued to the tailrace by means of a conical steel plate draft tube. The draft cases are made of cast iron and are separable in a horizontal plane parallel with the turbine shafts, making them easy of access. The center of each case is provided with a yoke or steady rest for the turbine shaft. The combined water wheel shaft is supported by three heavy cast iron pedestal girders that rest on the side or foundation walls of the penstock. The water bearings are amply large and are made from specially prepared wood blocks. These are hacked with iron and can be adjusted for water. The draft cases are supported by heavy spanning frames made from 15-inch steel I beams. These also rest on the side wall of penstock. This construction frees the arches over the tailrace from the weight of the machinery. The draft cases and pedestal girders



Penstock Unit Designed and Built by the Webster, Camp & Lane Co. for the Michigan Lake Superior Power Co, Sault Ste. Marie, Mich.

are tied together on each side by longitudinal bars, making substantial support for the running parts. The turbine shaft penetrates the curved bulkhead by means of a stuffing-box properly secured to the steel plates by rivets. The common horizontal gate shaft extends through the bulkhead into the dynamo room in like manner, and is provided with the necessary rigging to manipulate the gates of the four turbines simultaneously by hand or by machinery.

The turbine shaft at the end farthest from the dynamo room is 5½ inches in diameter and increases in size until it is 7¼ inches in diameter at the dynamo end, and is arranged to be coupled to the horizontal dynamo. Each of the four turbines is encased in a balance gate curb, while the individual gates are so poised as to direct the flowing water properly, and differently, at the different degrees of gate opening maintaining a high efficiency at part gate. This data is furnished by the installers, the Webster Camp & Lane Co. of Akron, Ohio.

BUT thirty-two days remain in which to do the required \$100 of work or improvements on unpatented claims. On unpatented claims located since Jan. 1, 1901, the time limit expires Dec. 31, 1902.

Deposition of Ore.

On the subject of ore deposition Dr. Becker of the U. S. G. S. says that with the exception when ores are deposited in beds, or in placers, like gold gravels, the existence of open subterranean spaces of greater or less size is a necessary condition for the formation of ore bodies of any kind. The ore may be deposited in openings which existed before deposition began, and which either were cracks between masses of rock broken asunder or were interstices in porous rock like sandstone. Room for the ore may also be made by solution of the rock mass either before ore deposition or during that process. It is a mistake, however, to suppose that the masses stopped out in the exploitation of mines usually represent spaces which were empty before the deposition of ore in them. It is said that cases occur in which open caves in limestone have been filled with ore, but cavities of this kind appear to be confined to limestone, and to have formed only above the water level of the district by the solvent action of surface waters charged with carbonic acid. Ore deposits, however, are by no means confined to limestones, and are more often found in rocks of this class which have never been drained than in those which have been exposed under the conditions needful for the formation of caverns. It is also conceivable that yawning fissures should form in the earth's crust, and that they should be filled up solely with ore and gangue minerals; but such cases, if they exist, are exceptional.

All observations and theory point to the conclusion that most fissures are formed under a compressive stress of greater or less violence, or that a tendency to compress the rocks into folds gives rise to fissures and faults when the applied force exceeds the tenacity of the rocks. It is also well known that in faulting the hanging wall commonly sinks relatively to the foot wall. Fissures formed under such conditions cannot yawn. The walls must come together at intervals, and the intervening spaces must be filled to a greater or less extent with the fragments of wall rock. Observation shows that veins very usually answer to this description and that the space occupied by ore corresponds, in great part, to the interstices between fragments of wall rock which loosely filled the fissure before the ore was deposited. This is observed with particular frequency in large veins, while small ones are comparatively free from rock fragments. Irregular ore bodies connected with fissures still more often represent masses of rock fragments rather than caverns.

In some cases irregular chambers, connected with fissures, are solidly filled with ore and gangue minerals. Such bodies are found in limestones under conditions which preclude the supposition that they represent pre-existing caverns and they are usually accompanied by evidences of substitution of ore for carbonate of lime. The deposits of Eureka, Nev., and Leadville, Colo., are of this type. In these cases broken rock seems originally to have filled the spaces in question, much as stopes in mines are often filled with rock by miners to prevent their collapse after the removal of the ore. Solutions of ore finding access to these spaces through the main fissures have come in contact with very extensive surfaces of limestone. The limestone has been dissolved and ore has replaced the rock, molecule for molecule. Whether similar substitution occurs in other rocks than limestone, and with other ores than those of lead, has not been sufficiently investigated.

Fissures in the earth's mass would extend indefinitely, both laterally and vertically, if the rocks possessed neither plasticity nor elasticity. No rocks, however, are devoid of either of these properties. It is well known, accordingly, that fissures are not of indefinite length. They sometimes pass over into folds, as several geologists have pointed out, and even in granite areas dikes of eruptive rock may sometimes be observed, which diminish gradually in width to a fine edge and disappear. There is every probability that fissures also die out in depth in similar manner, though where considerable faults have occurred the depth of a fissure must be very great. Many fissures certainly penetrate from the surface of the earth to the foci of volcanic atmosphere, a depth at least equal to that at which earthquake shocks originate, or several miles from the surface.

"When the term fissure vein is used without qualification it brings to mind a very simple and common form of deposit, a fissure with well-defined walls, usually nearly straight, or curving gradually and including vein matter which is commonly composed of ore gangue, and fragmentary masses of country rock. It appears to me very desirable not only to call a deposit of this kind a simple fissure vein, but to limit the application of this term to veins of this kind.

"Where the formation of a fissure is accompanied by a strong compressive stress groups of parallel fissures form, often passing over into a common fold at each end. The dislocation is then distributed over a number of parallel surfaces instead of a single surface, and this distribution takes place according to a definite law, which I have examined on other occasions. In some cases such fissures form with great

regularity and are distinct from one another as far as they can be traced. If ore-bearing solutions enter such ground they deposit distinct parallel veins. Such deposits are naturally described as groups of parallel veins.

"In many cases the tendency to the formation of groups of parallel fissures is obstructed, perhaps by irregularities in the tenacity of the rock or by the action of complex forces. In such instances approximately parallel fissures form, which die out in the direction of their strike, being replaced by others to one side or the other. More or less diagonal stringers must then exist, connecting the principal crevices. Sometimes fissures of this kind run together and separate again, without, however, diverging at any high angle.

"In all cases these veins are linked together by direct continuations of divergent strike or by small stringers intersecting the layers of rock which intervene between them. It appears to me convenient and natural to call such systems "linked veins," to distinguish them from simple fissure veins and parallel systems of veins on one hand, and from netted (or rectangular) veins on the other."

There are still other less usual groupings of veins which do not need to be christened. No one would hesitate to speak of a system of veins which radiated from a central point as radiating veins, or of a vein which sends off numerous stringers into the country rock as a branching vein, and such descriptive terms are clear and precise.

A slight degree of irregularity in the tenacity of the rocks or in the character of the rupturing force suffices to produce linked fissures instead of groups of parallel fissures. Greater variations in the rock or a torsional stress accompanying the dislocation will result in crushing portions of the country rock adjacent to the main fissure. This crushing will not, as a rule, be confined to a simple zone parallel with the fissure, but will reduce only occasional masses of rock along the fissure to fragments. When in such cases ore and gangue minerals are subsequently precipitated the deposit will be confined to the main fissure where the adjoining country is unbroken, but it will spread into the neighboring rock where crushing has occurred, the excrement ore bodies being nevertheless merely lateral extensions of the filling of the fissures. Miners then usually call the entire occurrence a fissure vein, and with no little reason, since the whole deposit is so violently and closely dependent upon the existence of a fissure. In some of the simpler cases of this kind even formalists will grant the applicability of such a term as irregular vein, or vein with irregular walls. "Pipe vein" has also sometimes been used to express structure of this kind, but this term has been applied in such various senses as to be objectionable. When the irregularity of the deposits is great it has been used for mining engineers and geologists to describe rather than to name them, to speak of stock works and impregnations connected with them, and the like. It does not seem expedient, however, to designate ore bodies so closely related by different names unless the connection is also expressed by some appropriate term. The connection existing between the various portions of a deposit is at least as important as the form of the various parts, and if miners err in giving a wrong impression as to form, the usual nomenclature of mining geologists ignores the close interdependence recognized in the language of the miners.

"It seems to me that deposits of this description may conveniently be called 'chambered veins,' and that the irregular excrement bodies of ore of such deposits may fitly be denominated vein chambers. I

which are to some extent chambered, or which show a tendency to chambering.

"In granites and gneisses it is not infrequently the case that simple fissure veins are formed which, from the croppings downward, are very irregular. I doubt, however, whether, if in these cases the surface still remained as it existed at the time when the fissure was formed, the superior portion of the deposits would be found to possess an equal degree of regularity. When a fissure is formed a fault almost or quite invariably accompanies it, for it is a force tending to elevate one portion of a region above another which usually produces the fissure. When a fault takes place it is well known that the hanging country is commonly depressed relatively to the foot wall, and a projecting edge of the hanging ground must then press and scrape against the foot wall. This wedge-like mass, not being supported at the surface by overlying rock, is greatly exposed to fracture, and will generally be more or less fissured, even when it is composed of firm material, such as granite. If ore deposition follows from solutions which reach the upper part of such fissure, the irregular cracks in the lip of the hanging country will fill with vein matter and the simple vein will be surmounted by a chamber or a series of chambers close to the surface.

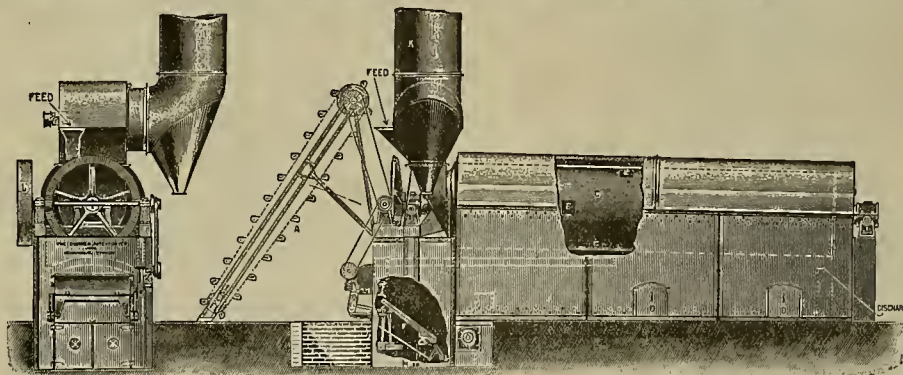
"If a country he composed of rock of a feeble and variable tenacity the tendency of the ground near the surface to break up into irregular fragments will be much greater than where the country is firm and homogeneous, and the formation of chambers of ore close to the original surface is the more to be expected. The ore bodies which were found near the croppings of the Comstock lode were of this description, and so are most of the superficial cinnabar deposits of California.

"I propose for these irregular bodies found at the croppings of veins the name 'cap chambers,' to distinguish them from the lateral ore bodies of chambered veins. The term vein chamber, then, includes cap chambers as well as lateral chambers.

"So far as we know anything of the mechanical conditions of ore deposition, it appears from the foregoing paragraphs that many deposits which now appear as simple fissure veins must once have included cap chambers, and must consequently have come under the definition which I have proposed of a chambered vein. The cap chambers in these cases must have been removed by erosion. Where ore deposition has continued until all available crevices were filled, as has sometimes, but not always, been the case, it is evident that cap chambers will contain a comparatively large amount of ore, often more than will be found within an equal vertical interval far from the surface, where the fissure system is more simple. Such was the case, for example, on the Comstock lode. Such also may have been the case on the gold belt of California, and the immense amount of auriferous gravel would then not represent the erosion of contracted quartz veins, such as are now being mined, but of the cap chambers of the veins. This hypothesis greatly reduces the amount of general erosion which the existence of these gravels would imply."

New Type of Dryer.

Herewith is illustrated a new type of dryer of the same principle as the Cummer style "Salamander" and style "F" dryers, incased in 1-inch plates on the sides and with a corrugated iron cover which consists of two thicknesses of corrugated iron with the corrugations running at right angles with the cylinder.



New Style Cummer Dryer.

propose these terms to express the external form only, and to embrace irregular ore bodies contiguous to a fissure, whether they consist of reticulated masses, of impregnations, or ore deposited by substitution. A chambered vein may, then, be defined as a deposit consisting of an ore-bearing fissure and of ore bodies contiguous with the fissure which extends into the country rock. The term is intended for use in contradistinction to the term fissure vein, or, more explicitly, simple fissure vein, which is thus restricted to those cases in which the occurrence of ore is limited to a single, defined fissure. Transitions between the two forms are not infrequent, and such occurrences may be referred to conveniently as veins

Between these two plates is an asbestos air cell board that is non-conductive of heat. The plates which form the furnace and the side walls for the dryer cylinder have a 9-inch lining of firebrick, with an air space between the plate and the firebrick lining.

The illustration shows the dryer fitted with a Cummer patent mechanical stoker, but the furnace can be arranged with grates for burning any kind of fuel. The material to be dried is lifted by the elevator A into the feed hopper, discharging into the dryer cylinder C, which is driven by the large pulley and gearing shown in the end elevation of the apparatus. The shaft of this pulley carries a cone pulley

which drives the belt operating the stoker. The heated air from the furnace is drawn into the cylinder through the square openings E, and after passing over the material to be dried is discharged through stack K by a fan in the horizontal flue at its base. The holes E are protected by hoods, which prevent the material from dropping out while permitting the free entrance of air. There are registers D in the sides of the casing, which are used for regulating the temperature of the air before it is admitted into the cylinder. The dryer is made in several sizes, for use with coal, stone, marl, clay, slag, ores, concentrates, slimes and other materials by the F. D. Cummer & Son Co., Cleveland, Ohio.

An Automatic Dumping Frame for Shafts.

An arrangement for tripping and dumping huckets at the head of tunnel, mine and other shafts has recently been introduced for the purpose of reducing the amount of labor ordinarily required for this work. The general design is shown in the accompanying cut. Instead of the usual form of head frame with fixed sheave above the mouth of the shaft, the frame is made with inclined top timbers, the incline being 5 inches to the foot. Upon the frame travels a steel carriage or trolley, upon which is mounted the main hoisting sheave.

While the hucket is being hoisted the carriage is at the lower end of the travel, being held by the rails, which are bent upward to form a stop. When the bucket is hoisted clear of the shaft a stop prevents it from rising too high, but the winding of the cable still continues, and the carriage is thus hauled up the incline until it is automatically caught and held by a pair of latch bars at the head of the incline. The cable is then paid out and the hucket lowered upon a dumping platform, which has a slot to receive a loose chain attached to the bottom of the hucket and carrying a disk or hall at its end. The weight of the bucket tilts the platform, and the hucket is inverted, being held to the platform by the ball, which cannot

atomic weight of a body in the solid condition and its specific gravity. The atomic weight of mercury and lead is greater than that of gold because it takes a greater weight of mercury or lead than of gold to combine with a given amount of hydrogen or its equivalent. But the specific gravity of gold is the greater because the ratio of its weight to an equal volume of water is greater than the corresponding ratio of mercury or lead.

If a person standing on the wet ground touches one of the wires of an overhead electric circuit, will the body, through which the current passes from the wire to the ground, receive the full voltage of the line, or not?

Yes.

Does it matter whether the negative or positive wire is touched?

No.

Will a shock result in either case?

Yes.

La Cananea, Sonora, Mexico.

Sinking or Tunnelling.

In mining, as in other occupations, things are often done because they are considered proper, and without any thought on the part of the miner. Men, in a certain district, get into the habit of performing certain operations in a certain way and make no attempt to see if other methods would not serve them better. Because a certain method gives a good result in one case it is too frequently assumed that it will give good results in other cases where conditions are entirely different. The practical miner is apt to know his own particular mine very well, and this knowledge gives him a certain contempt for geologists, or other trained observers, who bring a wider knowledge and more unbiased judgment to the work in hand. Perhaps the conservatism of

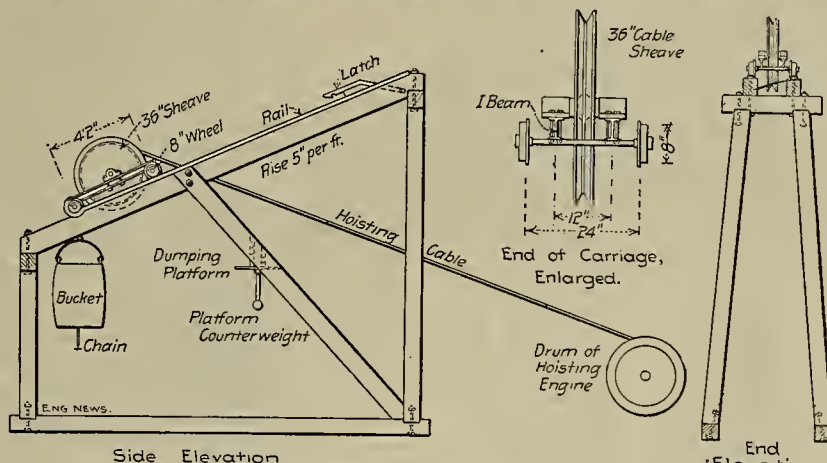
in the vein, and is a tangible, self-evident thing to show a prospective investor. Again, shafts, vertical or inclined, that follow the vein will show up any changes in the ore and give a large amount in sight. Thus four shafts 50 feet down in a ledge 4 feet wide would expose 1680 square feet of the vein. A tunnel driven 200 feet through rock to cut the vein would expose but the section, the height and width of the tunnel, say 100 square feet. To expose a larger area, drifting must be done, and such drifts can be run with better discrimination at the foot of a shaft than has followed the ore.

In the great majority of cases the miner, working by rule-of-thumb methods and disdaining to go at a thing in a scientific way, proceeds in an altogether different way from that outlined above. Having staked off his claim, often located on the strength of an apparent outcrop of ore, or on the showing of a single shallow shaft, he proceeds to run a tunnel. The miner or prospector with limited resources wastes only his own time and money by such work. It is when the practical miner undertakes to open up a claim for some company floated with \$1,000,000 capital, or some other attractive figure, that great mischief is done. A tunnel is started to open the ledge, say at 200 feet. Now, assuming that the ledge dips into the ground vertically, that the slope of the hill is 45°, and that the tunnel is driven at right angles to the course of the vein, a tunnel 200 feet long will cut the vein at a depth of 200 feet. It is easier to tunnel than to sink this distance. The dirt and rock can be trammed much easier than it can be hoisted, the tunnel will drain itself and if the ground is at all wet there is no need of the expense of a pumping outfit.

So much for the advantages; as a matter of fact, the different factors are seldom as cited above. The evidence that can be gained from an apparent outcrop or one shaft is very misleading. A common error is to mistake the slope of the hill. Any ordinary hillside is very much more likely to be a slope of 25° or 30° than 45°, and the tunnel to open ground at 200 feet may have to be driven 400 feet. In a tunnel of this length the chances are that the ventilation will become bad at the heading, long waits will be necessary after each blast, work will proceed slowly, and finally some sort of ventilating plant will be necessary. Again the dip of the vein may be unknown, as the apparent outcrop may be slide-rock. If ore has been found in place, and the dip of the vein determined by one shaft, still the pay value may be confined to a shoot or chimney, the limits and inclination of which, in the plane of the vein, are altogether unknown. In such case the tunnel expected to strike a vein in 200 feet, approaching from the foot-wall side, may fail to reach it in 500 feet. When finally cut, the vein may be absolutely barren. The section exposed is just the size of the tunnel; whether there is rich ore to right, to left or below it, is absolutely impossible to say, except by doing what might have been done in the first place, that is, by following the vein. In the case of a mining company that has gone into such a venture on a non-assessment plan, the end comes quickly and certainly. The funds raised from selling stock are used up in driving the tunnel 200 feet or more. Failure to find the vein where expected lessens the value of the stock. To keep on with the tunnel the treasury stock reserve is sold at a sacrifice and finally the company finds its treasury bare and nothing but a barren vein to show. The stockholders are out of pocket and the locality gets a black eye.

Of course, tunnelling and drifting are used frequently to advantage in opening up mining properties, as one can see in any famous camp in the West; but tunnels should follow preliminary examination and be laid out as the result of definite knowledge. If the formation of the vein dips with the hillside so that a tunnel will strike the hanging wall, it may be quite possible to open up the vein at a depth of 500 feet by a tunnel of only 200 feet. Here the advantage of the tunnel is evident. Again, if the ground is very wet, as it may be in regions where the rainfall is heavy, the cost of getting in pumping machinery may be so great as to make tunnelling a necessity. Some of the newly opened districts at Washington and British Columbia show this. Then there is the case where the course of the vein cuts across the slope of the valley so that one end of a 1500-foot claim is considerably higher than the other. A tunnel, or more properly drift, is then the only way to open the ore. Such a tunnel, being always in the vein, will show any variation in width and value, there will be no trouble from water, and the property will be opened at the smallest expense possible.

Though miners generally make the mistake of drifting or tunnelling instead of following the vein by a vertical or inclined shaft, yet one sometimes sees opposite mistakes made. During the excitement over the discovery of the Mesabi Range in northern Minnesota some years ago, a company was formed to work one of the very few places along the range where the iron ore formation or jasper was exposed. The company was capitalized at \$3,000,000, built an expensive camp, and hauled in a lot of machinery at great expense through the virgin forest. The outcrop formed on one side a bluff 50 feet or so high. Standing at the foot of this bluff any one could see, as the banding of the rock was horizontal, the changes in its composition; yet those who had



Automatic Dump for Shafts.

pass through the slot. The empty bucket is then hoisted into position again and the latches released. Then, as the cable is unwound, the carriage runs back to the shaft and the hucket descends.

The operation, as described by the Engineering News, is said to be very rapid and reliable, and is entirely controlled by the man at the hoisting engine. The apparatus can be so arranged as to dump into different pockets or bins. The plant is being introduced by Fairbanks, Morse & Co. of Chicago, and has already been installed by the Forest City mine at Leadville, Colo.; the Alcazar Mining Co. at San Antonio, N. M., and at other mines in Colorado and Arizona, where labor is scarce and expensive.

Some Questions and Answers.

If a dynamo were placed in an enclosure from which the air had been exhausted, would it generate a current of electricity?

Magalia, Cal.

The generation of an electric current in a dynamo depends upon the cutting of magnetic lines of force by an electric conductor. This would take place in a vacuum as well as in the air.

A number of us here want to know why are the atoms of mercury and lead heavier than those of gold? The specific gravity of gold is greater than that of mercury and lead. In other words, why is the atomic weight of mercury and lead greater than that of gold? All atoms are of equal volume—why the difference?

Glendale, Or.

The assumption that "atoms of mercury and lead are heavier than atoms of gold" begs the whole question. This matter is all only theoretical. Science everywhere accepts the atomic theory, for though it is only a theory and can not be proved, yet everything acts as though it were true and had been proved—hence, is not gainsaid.

There is no direct and simple relation between the

the average miner and prospector in the Rocky mountains, or on the Pacific Slope, is most evident in his clinging to the idea that the best way to find out what there is in the vein he has located is to "prove it with depth" by a crosscut tunnel.

As a matter of fact, when a miner has staked out his claim the first and most essential thing is for him to determine, as nearly as he can with the means at his disposal, the direction of the vein. Thus he will know whether his location really covers the vein, thereby very likely saving himself a heart-breaking lawsuit should the vein prove valuable. In case the surface debris is not deep, say 10 feet or less, it will not take him very long to dig some surface crosscuts the whole width of the vein. He will find out also whether the ore that he located is really in place, or whether it is slide or float rock from higher up the hillside. Having determined the general direction of the ledge, and opened it, if the surface is not too deep, in at least four places on a claim 1500 feet long, the next thing to do is to sink on the ledge far enough to determine accurately its dip or the inclination at which it slopes into the ground. Then if, as stated, the vein has been opened up at at least four points, several hundred feet apart, a careful analysis of the rock from the bottom of the different pits or crosscuts will show whether the vein grows richer in one direction than in another, or carries fairly uniform values. Having ascertained this much, the prospector is in a position to go to work systematically. He can decide whether he shall sink his shaft deeper or run a tunnel. He can also tell where is the best point to locate his shaft or tunnel so that it will show up the vein to the best advantage.

Generally speaking, the best advice that can be given in opening any mineral deposit is "follow the ore." There is no other way by which the ground can be shown up so thoroughly, and the ore taken out will go often a long way toward paying expenses. Even if the ore is not rich enough to pay for shipment, it is always evidence of the value of the rock

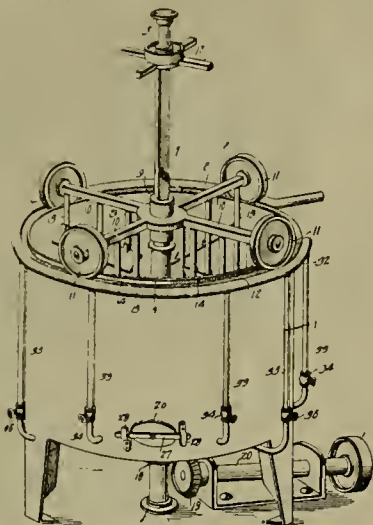
charge of the exploration had so little judgment that they actually started sinking on the top of the bluff, so near the edge that the rock brought up was dumped over it. Such work, of course, could have but one result. The company started off with a flourish, selling stock right and left. A year later the sheriff, looking for some unattached property against which a claim could be laid, found only a desk in the office at Duluth, and even this, as it proved, had not been paid for.

Mining and Metallurgical Patents.

Patents Issued November 18, 1902.

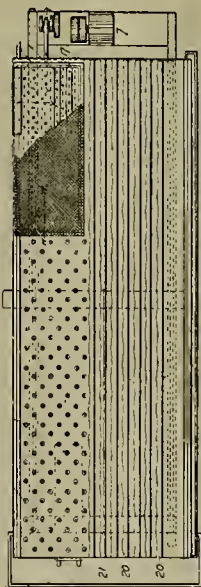
Specially Reported and Illustrated for the MINING AND SCIENTIFIC PRESS.

ORE MIXING MACHINE.—No. 713,694; J. P. Schuch, Cripple Creek, Colo.



Ore mixing machine comprising following elements: Ore mixing tank, false bottom including strainer, means for discharging air beneath strainer to keep meshes thereof free from any accumulation of slime, air supply pipes disposed above strainer to effect aeration of contents of tank, track carried by upper outer portion of tank, agitator shaft having upper portion polygonal in cross-section, spider having hub engaging polygonal portion, carrying traveler wheels at extremities to engage track, agitator bars suspended from spider, beaters or stirrers carried by bars, each set being disposed in break joint order with relation to adjacent set of beaters.

CONCENTRATOR.—No. 713,814; A. Ten Winkel, Denver, Colo.



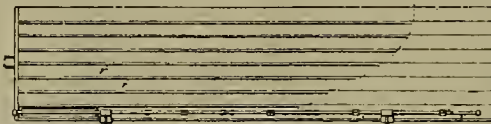
Combination with transversely inclined concentrating table having movement tendency to carry material longitudinally from head toward tail of table, means at one of upper corners of table for feeding pulp thereto, water receptacle mounted on table covering suitable area at ore feed corner, screen located above water receptacle, intermediate plate provided with projections having openings in upper extremities forming nozzles, means for introducing water to water receptacle, forcing it up through nozzles, thence through screen arranged to receive pulp as fed to table.

PROCESS OF COMBINING TITANIUM WITH IRON.—No. 713,802; A. J. Rossi, New York.

Process of combining homogeneously with iron a

certain predetermined percentage of titanium which consists in bringing together mixture of titanic acid and iron, with carbon sufficient to deoxidize titanic oxides, proportion of titanic acid to entire mixture regulated so as to secure in product derived from next step from 2% to 5% titanium, next supporting ingredients, subjecting them to heat 3500° F., until iron and titanium resulting from deoxidization of titanic acid, are thoroughly molten and homogeneously commingled, withdrawing molten mixture from temperature, allowing it to solidify; reducing to molten state, while suitably supported by application of temperatures usually required to melt iron, both iron to be titanized and quantity of solidified mixture required to impart to resulting final product required percentage of titanium, continuing support subject to last mentioned temperature until constituent titanium has been melted and homogeneously distributed throughout mass, finally withdrawing product from the temperature and allowing it to solidify.

ORE CONCENTRATING TABLE.—No. 713,747; I. A. Cammett, Denver, Colo., assignor to Denver Engineering Works Co., Denver, Colo.



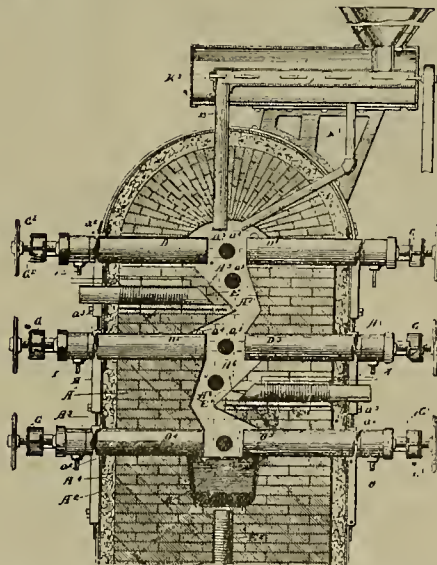
Concentrating table having table surface embodying series of raised ribs or riffles which in part are raised on both sides, and in part are raised only on one side, forming step-like formation, line or zone of demarcation between such part being less oblique to ribs on upper or higher side of table and more oblique or transverse to ribs on lower or tailings side of table.

BLASTING FUSE.—No. 713,878; Heath & Taylor, Cripple Creek, Colo.



Body portion having flared open end, fuse with end inserted in body portion, combined with protecting waterproof covering having inner end frictionally held compressed between outer surface of fuse and inner surface of flared portion with outer end extended beyond outer end of flared portion bent back over end thereof embracing outer surface.

ELECTRIC FURNACE.—No. 713,923; A. A. Shade, Chicago, Ill.

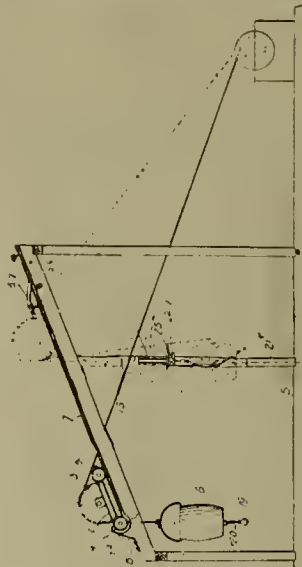


Electric furnace provided with interior passage, means for feeding material to upper end, crucible at lower end, electrodes arranged to form plurality of arcs in passage, one located immediately above open end of crucible, oblique ledges located below certain arcs extending into path of material, magnets in wall of furnace adjacent to ledges, magnet below crucible, means acting to localize effect of upper magnets to elongate adjacent arcs toward ledges.

PROCESS OF PRODUCING METALLIC ANTIMONY.—No. 714,040; T. C. Sanderson, Chelsea, N. Y.

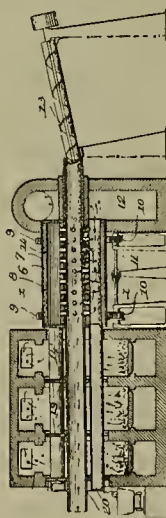
Process of producing metallic antimony, providing molten bath of sulphide iron; immersing in bath antimony sulphide ore; adding suitable reducing agent for reducing antimony ore; running off metallic antimony from bath, whereby process may be carried on continuously for reduction of repeated charges of antimony ore.

AUTOMATIC BUCKET DUMPING MECHANISM.—No. 713,932; T. E. Anderson, Denver, Colo.



Automatic bucket dumping mechanism, combination with bucket and cable connected therewith, of framework provided with inclined track, carriage mounted on track, sheave journaled on carriage, bucket cable passing over sheave, stop on cable arranged to engage carriage and limit movement of bucket independently of carriage, normally balanced platform, vertical guides beneath track and between ends in which platform is vertically movable, capable of rotation at either end, pendant attached to bucket and arranged to catch on platform, means for holding carriage against downward movement while cable is slackened to allow bucket to rest on platform, arrangement being such that platform is tipped and bucket dumped suspended in inverted position, means for automatically releasing carriage as latter is drawn upwardly on track, whereby as cable is subsequently slackened carriage and bucket will move downwardly on track to original position.

APPARATUS FOR ROASTING ORES.—No. 714,099; W. F. Collins, Boston, Mass.



In apparatus for roasting ores, furnace, substantially arranged open ended tube extending through furnace, one end of tube being perforated, combustion chamber surrounding perforated portion of tube, plurality of retorts surrounding tube extending through furnace, retorts each communicating with combustion chamber, means to rotate tube and retort, construction being such that air to support combustion in combustion chamber is drawn through tube.

Carnotite.

Carnotite is a vanadate of potassium and uranium. It occurs as a yellow crystalline powder, or in loosely cohering masses, easily separated by the fingers. It is intimately mixed with a quartzose sand. The formula given for it is $K_2O \cdot 2U_2O_5 \cdot V_2O_5 \cdot 3H_2O$, deduced from the following analyses (after separation of silica) of air-dried material:

V_2O_5	U_2O_5	K_2O	H_2O
20.12	63.54	10.37	5.95—99.98
20.31	64.70	10.97	5.19 Fe_2O_3 0.96—102.13
19.95	62.46	11.15	... Fe_2O_3 0.65

It occurs in Montrose county, Colo., in cavities or associated with malachite and azurite. Some samples show 60% silica, the purest 2.6% to 7.2%. Separation is accomplished by nitric acid.

Mining Summary.

Specially compiled and reported for the
MINING AND SCIENTIFIC PRESS.

ALASKA.

Cook Inlet reports that the Polly M. Co. has rich ground, and next season will put in a hydraulic plant. The Silver Tip mine has been bought by Eastern men, who will work it on a large scale during the summer of 1903.

Manager J. Girdwood of the Crow Creek M. Co. expects to have his hydraulic plant in running order June 1, 1903.

The largest nugget ever found in Cook Inlet district was picked up by A. Davis, one of the workmen in the Bear Creek mine. O. H. Sleeper is manager. It weighed sixteen ounces; its value was \$275 at the San Francisco mint.

At Nome, previous to 1902, the work on the Seward peninsula was largely of a superficial nature, but during the past season more real mining has been done. Ditches have been dug and water brought in for hydraulicking, notably the Miocene and Topkuk ditches, the Wild Goose Co.'s option ditch and that of the Hot Air M. Co., the last named being 5 miles long, grade 6 1/2 feet per mile. The gravels of this district are loose, with few boulders, not requiring a heavy pressure of water to wash it down. On Anvil creek, Candle creek, Gold Run and Bluestone it has been found that there is more gold in the benches than in the stream beds. The work done this season has proven that there are extensive deposits that could not be sluiced with profit, which will give good returns if hydraulicked. Quartz mining is getting a start. At the Burrah ledge, near Solomon, a 10-stamp mill is being put up. Work has been done on quartz claims on Snow gulch, Rider creek and in the Golden Gate district.

ARIZONA.

COCHISE COUNTY.

Fifty-seven mining locations were filed for record in the recorder's office during the past week.

The Calumet & Bisbee Development Co. is reported organized at Bisbee. Their property adjoins the Lake Superior & Pittsburg property, Warren district.

The property of the Tombstone Con. M. Co. will be unwatered, when miners will go to work in the stopes and drifts.

The Miner describes operations at the Bisbee-West, where a three-compartment shaft is being sunk to a depth of 1000 feet. There is one shaft on the mine down 740 feet, with 1300 feet of drifts. The company has a franchise to supply Bisbee with water; 4-inch mains will be laid through the town and the water piped from the mine to Bisbee; oil will be used as fuel. The pumps will raise 300 gallons per minute. The engine for pumping the water is built on the air system; instead of the exhaust being wasted, it goes down to the next station and forces the water pump there. The camp is 12,000 feet across the mountain from Bisbee and 6 miles around by the wagon road. Superintendent Dwight expects to have fifty men employed.

R. Oates of Calumet, Mich., has organized a company that has bought the Blair claims, adjoining the South Bisbee property, for \$200,000, paying \$75,000 thereon.

The Bisbee Miner reports that the Modern M. Co. will unwater the shaft, when sinking will be resumed. In the drift on the 200-foot level assays show 3% copper, \$5 gold, \$1.85 silver. The general formation is schist between lime and porphyry. The shaft is down 230 feet.

The Phelps-Dodge smelter at Douglas will have five furnaces, each 204 by 42 inches, with a battery of four converters, 8 by 11 1/2 feet in size. The smelter building will be of steel, 40 by 150 feet.

GILA COUNTY.

Two concentrators will be put in the mill being erected by the Pinto Creek M. & S. Co.

T. Crandall is superintending a group of copper claims on Tonto for the Confederate M. Co.

L. M. Teal is superintending the Pinto Creek M. & S. Co.'s Yo Tambien mine. The concentrating plant will be completed Jan. 15, 1903.

C. M. Clark will push the electrical project for transmission of power from upper Salt river to Globe.

At the Old Dominion, at Globe, it is thought to be the intention of the management to run two furnaces only while utilizing the flue dust, and as soon as this is completed to run one furnace only. The loss in slag with the present smelter is stated to average about 1.72%. This loss may be reduced to 1/2 of 1%.

GRAHAM COUNTY.

The Arizona Copper Co., beginning with Nov. 1, discontinued the custom of work-

ing on Sundays in the mines and works. It is said that the DCM Co. will follow suit.

MARICOPA COUNTY.

Near Wickenburg the Electra mine work is being pushed on the east drift at a depth of 210 feet.

C. Goddard, at Wickenburg, has let a contract for sinking on the Goddard mining group. A ledge of ore 22 feet wide carries an average value of \$4.60 a ton. An ore reduction plant, 500 tons daily capacity, is projected on the Oro Grande, a steel galloways frame to cost \$40,000 and ore bins of 1000 tons capacity.

MOHAVE COUNTY.

Superintendent Guthrie of the Elkhart mines, near chloride, will have the property reopened. He will remodel the mill.

It is locally considered likely that the Leland people will build a railroad from Santa Fe to the mines. Lumber for a big mill is at Mellen, and will be forty stamps capacity. The road will be about 35 miles in length and along easy grades.

D. H. Moffat, who has judgment against the White Hills M. & M. Co. for \$26,000, will have the personal property of the company sold under attachment lien.

Superintendent Stevens of the Gold Road Co. is driving a tunnel to tap the mine at the level of the tram road, which is graded to the mill in the canyon below. The main shaft between the 200 and 300 levels is being cut out to the dimensions of a standard shaft and will be timbered.

On the 300 foot level of the Minnesota Connor a body of gold ore is reported, 1 foot of which runs eight ounces in gold per ton, 5 feet of ore show five and one-half ounces gold per ton, besides silver. On the 400 level stopes 5 feet in width are being opened up.

C. Metcalfe has arranged in Los Angeles for placing his pumice tufa on the market.

SANTA CRUZ COUNTY.

Mrs. Blair and Miss Barney are working the properties of the Viola M. and M. Co., Oro Blanco mining district, and have a 9-foot ledge running \$31.30 in gold, silver and lead.

YAVAPAI COUNTY.

S. P. Hooker, O. F. Woodward, C. N. Keeney of Le Roy, N. Y., will develop the Senate property, adjacent to the Congress.

Jerome expects that the works of the United Verde Copper Co. and its mines will be running full blast in February, 1903.

W. DeWitt, at the Planet Saturn mines, has been running the mill in a test run of 800 tons of ore from those mines in various lots, each lot taken from the different tunnels and drifts of the mine, one lot being taken commencing at the top of the shaft and extending to the bottom, for Eastern people, who have an option on the Planet Saturn and contiguous properties. The main shaft on the property is 1100 feet deep; there is 1000 feet of stopes and drifts; the vein is from 3 to 7 feet wide. The value of the ore is given at from \$18 to \$25 per ton gold. New York and Boston men have an option on the properties, which is said to include the Yarnell. They will put in air compressors and hoists, and later on an 80-stamp mill. The company has ample water to run a 100-stamp mill.

Near Jerome, G. W. Hull is repairing the damage done by the freshet at the Dillon tunnel, and will soon start the machine drills again.

At the Monarch G. M. Co. deep ore bodies are uncovered.

The erection of a smelter at the Iron King is projected by Supt. Giroux.

YUMA COUNTY.

W. J. Dorsey of the Trio M. Co. has bought the Maraquita mine for \$100,000.

J. C. Higley, owner of the North Star group of mines, will work the property this winter. A recent assay ran 15% copper and \$8 gold.

The King of Arizona and Fortuna mines are running full-handed.

CALIFORNIA.

ALAMEDA COUNTY.

An iron and copper smelting plant is projected on Oakland harbor on the Alameda shore of the estuary.

AMADOR COUNTY.

At the Bunker Hill an ore body 25 feet in width is reported in the 1400-foot level; estimated average in value \$6 per ton.

Superintendent G. W. Horn of the Horn mine, Defender district, has tapped the ore body with the tunnel; it is estimated to go \$30 per ton.

The Sargent property has a drift along the ledge at the 200 level to prospect the ore body. The drifting costs \$4 per foot.

Manager W. W. Worthing, Bay State mine, Plymouth, has made final payment on the bond of the Rhetta claim, adjoining the Bay State, of \$10,000. The Bay State has twenty men at work.

CALAVERAS COUNTY.

The Foot & Thompson mine at Rich

Gulch is bonded by the Western M. Co. of Colorado. Kavanaugh & Lewis of Cripple Creek are in charge of the work; eighty tons of machinery for the mine have been shipped to Valley Spring, on the way to the mine, comprising an air compressing plant, pipe, etc.

All the available men in San Andreas are working on the ditch near Calaveritas, which is being cleaned to take water to the gravel deposits at Calaveritas.

KERN COUNTY.

At the Gold Peak group near Bakersfield the Western Exploration Co., has ore in a 3-foot breast, giving \$31 in gold and 100 ounces silver per ton.

MARIPOSA COUNTY.

The Gazette hears that the 40-stamp mill of the Merced G. M. Co. will begin crushing rock from the Mary Harrison on Dec 1.

At the Golden Gate, near Whitlock, Manager W. H. Cavin is taking out ore and will start the 10-stamp mill next month. A new shaft is being sunk on the Imperial by Nevels & Hannah.

MONO COUNTY.

At Bodie the Syndicate mill has been hung up for the winter, all of the leasers' ore being crushed.

NEVADA COUNTY.

The South Idaho M. Co. is putting in hoisting and pumping machinery and will unwater the mine.

Near Washington, Supt. F. Enzensperger says he has a pay shoot 13 feet in width. A 20 stamp mill and steam plant are being installed. He expects to have the stamps dropping Jan. 15th.

The Gold Canyon M. Co., W. Gregory superintendent, has a bond on two claims near Moore's Flat—the Majenta and Santa Monica—and projects a 10-stamp mill.

The first gold taken out of the Houston Hill mine in thirty-two years has been extracted by Cocking & Co. The ore went \$16.80 per ton.

PLUMAS COUNTY.

One hundred and twenty men and twenty-five teams are used on the work of extending the Boca and Loyalton Railway toward Mohawk Valley from Beckwith.

J. Lytle has a derrick to remove large boulders from his river bed claim at the Vance mine, near Cariboo.

The Dunn mine, on the North Fork, is crushing ore that averages \$30 per ton. The owners will run their mill all winter.

A. N. Cameron has men running a tunnel on his gravel claim on Rich gulch.

H. & J. Kelly have finished an 800-foot tunnel and have found pay gravel.

SAN BERNARDINO COUNTY.

In the Old Woman mountains, near Danby, the Mountain Jewel M. Co. plans a 10-stamp mill. The Silver Wave 10-stamp mill is in operation.

E. J. Young, manager Southwest Ore R. & I. Co., in Virginia Dale mining district, will put up a reduction plant.

SAN DIEGO COUNTY.

W. F. Harris of the Home M. & T. M. Co. says men are doing development work with good results; principal values, copper and gold.

SHASTA COUNTY.

The Gold Mountain M. & M. Co. has been organized at Redding to work six mining claims south of the Mount Shasta gold mine. D. N. Honn is the Redding representative.

E. K. Gestford is developing a copper mining property near the Afterthought.

The miners employed in the mine and smelter of the Mountain Copper Co. at Keswick have walked out. Demand was made for recognition of the Miners' Union, which was declined. A complete shut down of all operations has resulted, and the suspension of work is indefinite. It is thought possible that there will be no move made by the company to operate any of the property for a year.

Fourteen men are reported driven from Keswick because of intense feeling against non-union men. The Mountain Copper Co. has discharged all of the machine men, molders and railway employees and several clerks in the company's store. The directors say there will be no compromise; the men are equally firm.

The Texas mine is reported closed. The lime quarries of Holt & Gregg, near Kennet, which furnished the smelter with fluxing rock, are idle.

The working force of the Afterthought mine is being increased.

At Redding has been formed the E. P. Connor Co., which projects a 200-ton smelter on the Sacramento river, 4 miles from Redding.

SISKIYOU COUNTY.

River mining will close on the lower Klamath this month. Near Etna the Dredging Co. is working to get the dam in again that was washed out by the high water of Scott river, near Callahans. The dam was to turn the river into a channel that would not interfere with the work-

ing of the dredge, and must be repaired before work can be resumed.

C. E. Humphrey of Barkhouse, near Walker, on Klamath river, will put a mill on the Commodore mine.

TEHAMA COUNTY.

The Southern Pacific Co. will build another oil tank at Red Bluff. The two tanks they now have there will hold, the small one 1,260,000, the large one 2,310,000 gallons. The third tank will be also of 55,000 barrel capacity, the three affording storage for nearly 6,000,000 gallons.

TRINITY COUNTY.

The Van Matre farm is under bond to W. H. Christie of San Francisco, who contemplates operating mining dredges on the property.

At the Enterprise mine, near Weaver-ville, a larger hoist, boiler and pump are being installed. The mill will be increased to twenty stamps.

TUOLUMNE COUNTY.

(Special Correspondence).—At the Bell mine, Tuttle town, Superintendent W. J. Rule is sending ore to a 5-stamp mill adjoining the Street mill. At the Street mine the mill is running, ore being supplied from the 300 north level.

The Morris Tunnel Co., operating near Sonora, have a new engine, and are pushing work on their crosscut tunnel to tap the Austrian vein. They are in 800 feet and have 200 more to run.

Surveys for a 24,000 H. P. plant, under the management of W. H. Hall, will be resumed next spring, to use the waters of Lake Eleanor, Kibba lake and Cherry valley. Three dam sites have been established, and 6 miles surveyed of the 17, the full length of the projected ditch designed to carry 5000 miners' inches. Two independent plants are planned 8 miles above Carters.

Sonora, Nov. 24.

Near Groveland, at the Mohican, the 5-stamp mill is in operation. At the Melghan mine twenty stamps will be run on ore from the 300 and 400 levels. In the spring forty new stamps may be put in.

Work at the Longfellow goes on under the superintendency of F. H. Partington, who contemplates a 30-stamp mill.

At the Cosmopolite mine Supt. Argall finds that the crosscut is within a short distance of the ledge.

Near Groveland the Sierra G. M. Co. has three claims, the Nona F., Alethean and Even Chance. A double compartment shaft is being sunk.

The Banner says H. J. Dykes is operating the Oakland. The App mill, at Quartz Mountain, is in operation. The 10-stamp mill on the Mapes gravel claims, at Yankee Hill, will operate next week.

T. J. Holmes has bonded the John Royal, near Columbia, and will put in a 10-stamp mill.

E. C. Loftus is reported to be interested in the new company to work the St. Ysabel.

The Birney-Wainwright tunnel on Bald mountain made 98 feet in a month. They expect to reach the ledge in four months.

At the Miner's Dream mine, 8 miles from Carters, Berger Bros. have a stamp mill which is operated by a windmill. There is a feeder which is opened and shut automatically by the mill and the water from a tank is also regulated. The mill runs when there is a fair breeze; so far has crushed about a ton of rock a day. The vein at the mine is small but rich.

The suit over the Niagara mine in the Groveland district between Curley and O'Brien on one side and S. Carlton on the other, was decided by Judge Nicol in favor of the latter, on the second trial. The former partners won the suit on first trial. The case will be appealed. Carlton and witnesses swore that they had located the mine three days before their notices showed and the court took that testimony.

J. Rocco has men at work on the Basin mine near Nashton.

A telephone line will be built from Carters to the Mohican mine, 7 1/2 miles.

Superintendent M. T. Fillmore is putting machinery in the Alta Dina, once known as the Kearsarge, located on top of Yankee hill. A hoist and saw mill is nearly completed and a 10-stamp mill contracted for. The shaft is 120 feet deep. Drifts show the vein, which is incased between granite and slate walls, to be from 20 to 60 feet in width, averaging about \$7 to the ton.

The Golden Gate mine chlorination plant will use oil for fuel.

Near Groveland the Big Casino Co. is operating the Mack mine.

Superintendent F. H. Partington is pushing work at the Longfellow mine.

Manager W. J. Graham at the Mayflower mine has machine drills pushing the tunnel 8 feet per day.

The Big Creek M. Co. of Bangor, Me., owning fifteen claims near Groveland, is developing the property.

COLORADO.

BOULDER COUNTY.

The Longfellow mine at Jamestown reports 30 inches of smelting ore, \$100 a ton. Eldora reports that at the Lady Belle tunnel, on Woodland mountain, is a vein in a winze in their 125-foot bore 20 inches wide, assaying \$118 in gold.

Near Wall Street the Colorado N. G. M. Co. have electric drills. Their main tunnel is in 2150 feet; they have opened several bodies of ore.

Knott & Mitchell have a body of ore in the Montreal which samples \$10. It has an adit tunnel 510 feet on the vein which cuts the shaft at a depth of 250 feet.

G. R. Williamson, owner Yellow Pine group, is working the property. This property is thought to be the richest silver mine in Boulder county.

The Doss mine people have their ore bins full and the breast and back of slope shows bodies of ore.

Following a change in the management of the Tynon mine in Erie, 100 miners employed in the property went on strike. About seventy-five of the strikers were employed on the mine last winter when T. A. Bassett was manager. It had been announced that there would be a change in the management of the mine. On the 21st the men were told that Bassett would be in charge. The men refused to return to work until they were paid for back work.

CHAFFEE COUNTY.

Bismuth is reported discovered by Daniel & Crane between Manoa and Newitt. They say they have a ledge of quartz impregnated throughout and almost uniformly with the metal, the croppings at the surface averaging generally 100 feet wide of sulphide of bismuth. At the Salda smelter is another sample of 150 pounds of bismuth ore from the property of F. F. Clements on Badger creek, who has about 18 inches of bismuth ore that will run high in value.

CLEAR CREEK COUNTY.

The strike of free gold on the Jackson placer continues to improve. J. G. Roberts is sinking a shaft on the new discovery and reports 5 feet of quartz carrying free gold.

New machinery goes on at the Old Stag mine at Freeland.

Control of the Idaho Springs M. & R. mill has passed to B. F. and S. R. Strasser who will put in additional machinery for concentrating and steam power, giving capacity for 100 tons ore per day. J. N. Isgrig of Denver is manager.

Empire district is now sending 700 tons daily to the Golden smelter. The Gold Fissure mine, because of copper in the ore, has a \$4 rate. Some old time mines near Georgetown have also resumed shipments.

Near Freeland, the Freeland Extension mine is putting in a compressor. Manager R. McKenzie has resumed work on the Centurion tunnel.

Mrs. M. A. Allen, former owner Gold Cord stamp mill and concentrating works, is possessed of the property, and will in the future conduct its management.

In the lower tunnel of the Yankee Con. Co., made 1000 feet from the tunnel entrance, a smelting streak of white quartz carrying gold, silver, lead and copper, \$200 to the ton, 9 feet in width, has been found. This vein has 70 inches of smelting ore in addition to mill ore. A winze is being sunk.

Georgetown reports the new power plant at the Wilcox tunnel running satisfactorily; two rounds of shots broke an average of 13 feet. Carson & Heaton have a contract of 1000 feet, and expect to complete it by the middle of April.

The Clear Creek M. & Reduction Co. has made an advance of \$1 a ton in charges for treatment of ore at the Golden smelter. The smelter will pay for copper as usual and make no charge for silica. The Golden plant heretofore has accepted ores carrying a value as low as \$15, but the value is now advanced to \$20.

W. Rogers has a controlling interest in the Baltimore group and an option on the Shively, including right of way through the Bismarck. The tunnel of the Baltimore property will be pushed ahead to cut the Shively Owosco, Kilbride and other lodes.

CUSTER COUNTY.

At Silver Cliff is a great number of location stakes dotting the ground and covering an area of more than 5 square miles. A great number of 10-foot holes are in evidence. The principal locators are Haskell, Jackson and Ferguson. They have fifteen claims. The ore is chalcocite quartz, streaked and incrustated with a black material said to be manganese; about a carload of the rock is piled up ready for shipment. Time and development may demonstrate the existence of pay mineral in the new field; the present does not warrant excitement. The territory has all been taken and shuts out the prospector and the man with only enough

for grub stake. It is only the man with money and nerve that can tackle the proposition.

FREMONT COUNTY.

At Canon City a 100-ton addition will be put in at the Empire smelter. At this plant zinc and lead ores are exclusively treated. No attention is paid to the gold or silver, the silver being saved in the lead, but the gold is not considered as a by-product. The tailings are concentrated several times and the product is zinc.

The new cement mill at Portland, near Florence, was opened this week. The mill cost \$250,000, capacity 1000 barrels of cement per day.

Oil from the Florence field carries 31% illuminating qualities, with a heavy paraffine base.

GILPIN COUNTY.

The Foote & Simmons mine, Gregory district, is to have a plant of machinery and the shaft sunk 400 feet deeper to the 1000-foot point; S. Mellor is manager.

Near Central City the Columbus Con. M. Co. has a number of new ore bodies in the flat formation toward the northern extremity of its territory with average value of \$11 a ton, and is similar to the ore that is supplying the company's cyanide plant at present.

Robert Hastie, manager Viola G. M. & D. Co., operating in Russell gulch, has made a fine record. The company was organized October 9, incorporated the same day. Nine claims were bought and the management began work. Two shafts have been sunk, one 60 feet, which gives returns of \$20 per ton, and another 35 feet in which ore is found, valued at \$15 per ton.

The Pearce mine, in Central City district, has interested English capital and is to be reopened with J. H. Gower as manager. Machinery will be put up and sinking prosecuted.—The Notaway M. Co. will sink a new shaft.

M. P. Dalton of the B. & D. Con. M. & M. Co. is locally credited with having raised a large sum for the larger development of the Gregory-Bobbitt, Fisk, Cook and other properties in the Gregory district, and intention to sink the Cook or cage shaft 200 feet deeper, which will enable them to connect with the deeper workings of the Fisk and Gregory incline.

For the second week in November Central City district's shipments of smelting and crude ores, tailings and concentrates to the smelters and concentrators were seventy-three cars (1460 tons)—a total of 153 cars, or 3060 tons.

Central City reports ninety acres of mineral land, little of which has been worked, sold for \$250,000—the Summit, New York City, Brooklyn Sunset, and fifteen other lodes in Pleasant valley—by the Gilpin County M. & L. Co. to Indiana and Denver men. The new company will be the Sostoria G. M. Co.; general manager, B. N. Meyers of Central City; assistant manager, C. Ekgrig; treasurer, W. S. Strauser, Washington, Ind. The shaft will be retimbered and sunk 500 feet.

The Ingalls G. M. & L. Co. has bought the Straub, Straub Extension, Press and the east 250 feet of the Ashtabula lodes, in Eureka district, for \$10,000. Sinking progresses at the Straub, which is the main working shaft of the group.

The Avon G. M. & M. Co., operating the Avon, on Quartz hill, has the San Juan, and the two are to be worked in conjunction.

W. A. Garrett has bought the Bant lode, in Gregory district, for \$25,000. The shaft is to be timbered and sunk deeper. G. D. Johnstone is in charge.

GUNNISON COUNTY.

L. Cavanagh is appointed receiver for the Forest Hill Con. M. Co. The court orders sale of sufficient of the property to pay the first mortgage bonds of the company now overdue and amounting to \$219,333.33. The property consists of eleven claims in Tin Cup district. The stockholders and bondholders are residents of Pittsburgh, Pa., and Canton, O.

JEFFERSON COUNTY.

The cornerstone of the new Stratton Hall of Metallurgy at the School of Mines at Golden was laid last week with imposing ceremonies. The hall will cost \$55,000 when completed and was named in honor of the late W. S. Stratton of Colorado Springs in recognition of the \$20,000 he gave to the school for the building of an assay building. The money for the construction of the building is furnished by the State.

LAKE COUNTY.

The Ballard mill is designed to treat the low-grade ores of their property by the cyanide process; there are bodies of this siliceous material in the Ballard, the Penn and other mines of that locality which have lain idle for years because the smelter could not handle them. The cyanide plant has a capacity of only sixty tons a

day. This company built a mill near the Arkansas smelter a few years ago, but the talcose character of its ores prevented the cyanide solution from leaching through the mass. Improvements have been made since that time and ways to meet this difficulty have been found.

The pumps at the Keystone shaft, Iowa gulch, are handling 300 gallons of water per minute. In this locality the Reno is carrying on prospecting and development work.

The Yak tunnel is now in the heart of the gold belt, the heading is within about 300 feet of the Ibox line and will be driving in that territory by January 1.

The Sugar Loaf locality shows gains during 1902. The Orinoco, Gunnison, Fanchon and other leases are all taking out some ore. The Bartlett tunnel when completed will open another shipper. This tunnel will also be used for drainage.

Near Leadville the Progressive M. Co. reports a strike of 10 feet of \$50 lead carbonate ore, exposed at a depth of 280 feet. In one day \$500 worth of ore was hoisted to the surface and \$1500 additional broken and ready for hoisting. A new shaft has been started by the Fryer Hill Mines Co. on adjoining ground to catch the same shoot. The ore has been discovered in the new shaft of the Progressive M. Co., on Progressive hill, a low ridge which forms the northern boundary of Big Evans gulch, and is within 1500 to 2000 feet of the bonanza mines of the early days of Fryer hill. The ore is neither a streak nor a pocket, but appears to be a well-defined, continuous body, apparently a continuation of the Fryer hill shoot. The Fryer Hill Mines Co. is sinking a new shaft on the Pride of the West claim, which adjoins the Progressive M. Co.'s property, and is now taking out fine ore from the Tip Top property. A 4-foot streak averages 100 ounces silver. This ore body lies in a lower grade of siliceous material, of flinty character, which will carry an average of 10 ounces silver. In addition to the high-grade siliceous ore now being shipped, a considerable tonnage of iron ore is being moved, and some sulphide. Thirty-five men are working on ore. Manager Newell expects to have 100 men by January 1.

The El Paso's new pump, which handles 1200 gallons of water per minute, is taking care of the flow without trouble. Men are cleaning out the old drifts from the bottom of this shaft. When this is completed mining operations will commence in the old El Paso sulphide drifts.

New machinery is in position on the Harvard shaft, to put it down 1000 feet if necessary, or to reach an ore body.

LARIMER COUNTY.

At Pearl, the Grayton group of mines, formerly owned by C. B. Ayres, has been incorporated as the Grayton Copper Mines Co.

The Grayton group of mines near Pearl have been incorporated as the Grayton Copper M. Co., with headquarters at Denver and Grand Encampment.

LAS ANIMAS COUNTY.

Near Trinidad the fire in the Engleville coal mine is still burning, despite the efforts to smother it. It is feared that the eastern end of the mine will be destroyed. Men are walling up the entries and air courses. J. A. Kehler and C. H. Stevens, general superintendent and general master mechanic, respectively, of the Colorado Fuel & Iron Co., are supervising the work of fighting the fire.

OURAY COUNTY.

The Revenue Tunnel Mines Co. has a shaft sunk from the tunnel to a depth of 870 feet to prove the continuity of the ore measures at a greater depth. Good gold ore was found at the bottom, when the pumping plant got out of order, and the shaft filled with water and was abandoned. The distance from the bottom of this shaft to the surface is 2870 feet. Including the drifts, stopes, shafts, inclines, etc., the underground workings of the property, if strung out, would make a tunnel 35 miles in length. From the portal the tunnel bears in a southwest direction for 1½ mile, where a station is made. From this point its course is changed directly south, and extends a little more than 2 miles farther into the mountain. The Post says the incline from the Ophir tunnel connects with the tunnel on this side at the 2-mile station. The tunnel is double-tracked to this point and is almost large enough for a narrow gauge passenger train. The ore cars are run by an electric motor to the 2-mile station, and beyond that are drawn by mules. It requires 110 cars to convey the ore from the tunnel to the mill, and this number will now be insufficient to carry the increased quantity that comes down through the incline from the Ophir tunnel. The employees ride in and out on these cars going to and from work. E. A. Crisher, the mine superintendent, rides in and out on bicycles, following the trains of cars in or out.

SAGUACHE COUNTY.

A strike is reported on the property of the Hazard G. M. Co., 3 miles north of Crestone.

SAN JUAN COUNTY.

Level No. 7 of the Henrletta mine, Cement creek, Red mountain, is in 1900 feet. Smelting ore in the breast of the tunnel is 5 feet in width. They are drilling it by hand instead of by machine drills. Twenty tons of high-grade smelting ore at a single round of shots are being broken out. All of this ore is piled on the dump at the mouth of the tunnel. This smelting ore is the highest grade yet found in the mine.

Near Silverton, the Contention mill and lower tramway belonging to the Contention M. Co. is transferred to the newly incorporated Black Prince G. M. Co. The Black Prince group is ten claims on Arastra gulch slope, King Solomon mountain, and accessible by easy connection with the Contention tram and thence the mill on the Animas river.

SAN MIGUEL COUNTY.

A. B. Frenzel has thirty men at work on claims carrying vanadium ore, up Leopard creek, above Placerville. It is understood he has a transportation rate of \$15 per ton on the product from Wilson station to Paris, via Galveston. The United States Vanadium Co. has been organized to exploit and operate the property.

Vanadium is reported on Bear creek, 3 miles from Newmire, which is being worked by a company which ships the ore to London for treatment. This company will ship 1000 tons, on which they expect to clear \$15 per ton.

The Silver Pick mine of Mount Wilson, which has lain idle for two years, has mortgaged its property for \$100,000 and will resume operations.

In consequence of the murder of General Manager Collins, the Smuggler-Union M. Co. has closed its mines and mills for an indefinite period. The company employed between 400 and 500 men. Telluride offers a reward of \$10,000 for the arrest and conviction of Mr. Collins' assassin. Governor Orman offers a reward of \$2000.

SUMMIT COUNTY.

New York and Pennsylvania men project a 200-ton concentrating mill and a 500 H. P. electric light and power plant at Argentine, across the range, 12 miles from Georgetown, on a 200-acre tract of land which they own at the forks of Peru and Snake creeks, near Argentine and Montezuma. The mill is primarily for the ores being taken out by the Rothschild M. Co. They project a 1000-foot tunnel into Cooper mountain. The power plant will supply light and power for mines in the locality. They figure on 500 H. P. from the two streams.

Near Kokomo, the Michigan on Sheep mountain is shipping ore. The mine shows iron sulphides. The Breene tunnel expects to ship 150 tons per day. The Kimberley, Wilsey and White Quail are shipping. The Gold Cord tunnel is being worked at the foot of Jack mountain. The Union Con. group on Gold hill will place an electric plant to operate the tunnel.

TELLER COUNTY.

(Special Correspondence).—The St. Patrick G. M. Syndicate, Ltd., have a shaft 700 feet deep with 30 feet pump. Mine has 10x12 steam hoist, air compressor, 250-gallon station pump, 700 feet lift, two 100 H. P. hoisters and fine shaft house. Doing prospecting with diamond drills. They are crosscutting through the formation northwest and southeast, 1200 feet of drilling. Have a vein of low-grade ore. There are several veins known to run through the property, that are opened up in adjoining properties. They are doing some crosscut work from the center to the east and west side lines independent of the low-grade vein. On account of the low grade and having to haul the ore to the railroad it will not pay to ship. Eighteen men employed. Wm. Weston is general manager, A. P. Gallagher, superintendent. Victor, Nov. 20.

(Special Correspondence).—The Par Value G. M. Co., operating the Mary Cashen, Mary Alice, Dillon and a portion of the Monument, are hoisting from the third and fourth levels of the Mary Cashen and doing prospecting on the sixth level; shaft is 4x8 feet 820 feet deep. They are averaging about two and one-half carloads of ore per week. Ore runs two to five ounces in gold. Employing twelve men. Doing development work on the Mary Alice. Ore house at the Mary Cashen holds 300 tons. The mine is equipped with electric hoist. David Heaton is general manager, A. R. Pierce, superintendent. The shaft on the Dead Pine mine is down 700 feet, are sinking 300 feet further; 10x14 hoist, six drill compressor on the property; have an engine on the 600-foot level used for sinking. Forty men are

employed on Dead Pine and fifteen on the Queen, which is operated by the same company. Charles P. Oliver is manager. Victor, Nov. 23.

(Special Correspondence).—The Grace E. Mutual Leasing Co. of Cripple Creek are prospecting on Gold hill on the Progress M. Co.'s Gold King claim. Wilson, Patton Bros. & Lewis, Cripple Creek, are leasing on the Moon Anchor on Gold hill. Working on the third, fourth and sixth levels; working five men; shipping about seventy tons per month; ore averages \$50 per ton. N. S. Wilson is manager of the Moon Anchor, also one of the leasers.

The International mine on Gold hill is taking out ore that runs one and one-half to two ounces in gold from the third and fourth levels; shaft is down 400 feet; have a steam hoist on the mine.

James Ames of Cripple Creek has three claims on Bare hills carrying mica; vein is 8 to 10 feet wide. Books taken from the surface measure 14½x10 inches. He will put in machinery.

Mohrhaecher & Murrell of Cripple Creek have a lease on the Dolphin claim of the Golden Age Co. on Globe hill. The shaft is down 90 feet. They will put on machinery.

The Stratton Cripple Creek M. & Dev. Co., Cripple Creek, are operating the American Eagle, John A. Logan on Bull hill, and the Abe Lincoln and Chicago and Cripple Creek tunnel in Poverty Gulch on Gold hill. The American Eagle is producing 500 tons per month of \$50 ore. The John A. Logan has not been a regular shipper, but is looking better than for some time past; is now shipping four cars per week; averages about \$50 per ton. The Abe Lincoln is shipping four cars per week. The Chicago tunnel is making a good showing and the prospects are good for shipping; have a complete plant of machinery on each property. W. G. Rice is manager.

On Ironclad hill the Ironclad mine have eight men taking out fifty tons per day; ore averages \$12 from the fifth to the seventh levels; a small cyanide plant is on the ground treating the ore; 100-ton plant will go in. The ore they are taking out is the fillings from the old stopes. Cripple Creek, Nov. 23.

A daily output of sixty tons is being made from the Mary McKinney. No attempt is being made to drain the shaft of water below the 500-foot level. Supt. Keener says when the other mining companies are ready to take hold of the water proposition the directors will do their share. Lessees on the Anaconda Co.'s ground are outputting forty tons a day; average grade \$40 a ton.

C. Tillery, former superintendent El Paso Co., has a lease on a block of the El Paso estate, Beacon hill. A. G. Williams, late superintendent the Pinnacle Co., has a lease on a block of that company's ground on Bull hill. New leases on the property of the Gold Sovereign Co. on Bull hill are signed for one year, flat royalty 25%.

Consulting Engineer Bancroft, who has been retained by the administrators of the Stratton estate, is making examination of the different shafts and workings.

The daily production from Stratton's Independence, Ltd., is about 250 tons; average grade about \$25 a ton. A drift is being extended at the 150-foot level on the new ore shoot recently opened up.

In Cripple Creek district many men are doing development and assessment work outside.

Wilson & Co., leasing on the Moon Anchor, will do considerable development work this winter.

J. Wilson, who has a lease on the Thompson shaft of the Elkton Co., is shipping ore.

Stratton's Independence shipment for the week ending October 31 shows an increase in value of \$10,000 over the week preceding, the total production about \$45,000. The largest single day's production was October 27, when the mine produced 295 tons of ore, value \$1400.

On Mineral hill, at the Addie C., Manager J. M. Walsh says he will not cut his first station until he has reached 500 feet. The Laura Lee is being worked by three shifts under the management of C. W. Knox.

The government is making another geological survey of the Cripple Creek district under the direction of R. C. Evans.

Victor reports the Portland's output 250 tons a day. J. F. Burns is confident that the Portland will be opened up bigger than ever. A 100-drill compressor is being installed at shaft No. 2. The production from the mine, when the plant is ready for work, will be 600 tons a day. The greater portion of the ore now being mined is being treated at the company's reduction plant at Colorado City.

Manager Phillips of the Ben Hur announces the suspension of operations upon that property indefinitely. It is probable that a lease will be granted on the ground. It is generally supposed that the ore shoot

from the Midget pitches into Ben Hur ground at a depth of 800 feet. The workings of the company are now within 200 feet of that point.

Manager Rice will put in a 20-drill compressor at the American Eagles mine of the Stratton's Cripple Creek M. & D. Co. on Bull hill to supply air for the American Eagles, the Zenobia and the John A. Logan mines, the supply pipes being connected through the American Eagles. There is a 30-drill compressor on the John A. Logan that has heretofore furnished the air.

The water committee appointed to plan unwatering the Cripple Creek district has decided to adopt the El Paso tunnel, which can be constructed at a cost of between \$80,000 and \$100,000. The plan is to start the tunnel from the lower end of Arequa gulch, on Cripple creek, and run it 1 mile northeast to the El Paso mine, cutting the main water course of the district 1000 feet beyond that property. The tunnel will intersect the El Paso shaft at 600 feet and will drain the country north of there to a depth of 1000 to 2000 feet. Mines like the Blue Bird, on the top of Bull hill, will receive that much benefit, while the Elkton's benefit will be considerably less because of its lower elevation. It is expected to tap the main water course within seven months. It is proposed to work five breasts—one from the portal, two from the El Paso shaft, one north and one south, and two from an intermediate shaft to be sunk from the floor of Arequa gulch. This will make it possible to open the water course in the time specified. The intermediate shaft is an idea evolved at one of the meetings of the water committee.

The Elkton Co. has cut the Thompson vein on the 700. Lessee Wright is working this vein on the upper levels.

The special committee to build the drainage tunnel for the Cripple Creek district report good progress in soliciting funds for the project. All the mines to be benefited are willingly contributing their pro rata share of the working capital, and are putting up the necessary funds. It is conceded that the cost of the enterprise will be about \$80,000. There is some talk of a second and deeper drainage tunnel in the near future to unwater the camp at a depth of at least 3000 feet.

At Cripple Creek the Last Dollar shipped this week 200 tons of ore to the smelter.

The El Paso Con. G. M. Co. is getting out thirty-five tons daily of smelting ore.

The La Montaigne M. & L. Co., on block 8, school section 16, have cut the ore shoot on the 450 level. They have drifted 160 feet on this shoot at the 350-foot level.

A number of new leases on the property of the Gold Sovereign, Bull hill, all to run one year, royalty 25%, have been signed.

A 20-drill compressor is being installed on the American Eagles by the Stratton Cripple Creek M. & D. Co.

The Cripple Creek M. Co., operating the Hull City placer, is locally credited with producing \$100,000 a month.

The Independence Con. Co. receives on an average of 33% net on all shipments. The company took hold of the property two years ago upon terms favorable to the company. The shaft, then at 700 feet, was put down to 1070 feet, and drifts run on the veins showing at that depth. The indebtedness of the company, amounting to about \$60,000, has been wiped out. The mining operations are in charge of R. P. Russell.

On Dec. 13 all the property of the Gold Calf Con. M. Co. is to be sold to satisfy a judgment in the sum of \$362.80, obtained in favor of E. Hartsborn. The property of the company consists of the Gold Calf, survey No. 8845; the Lulu, the 92 No. 2, the Happy Jack and the Little Bertha lodes.

A recent strike on the Gold Sovereign property on Bull hill is pronounced exceedingly rich; the rock that showed no sylvanite or free gold assayed \$1680 per ton. This ore body was opened up in the 600-foot level 100 feet from the shaft. On the west contact of a 4-foot shoot and within a thin setting of green talc was a mass of sylvanite, while on the opposite wall protruding from a brown porphyry was a mass of native gold. Lying on each side are other bodies each nearly as wide with an average value of \$94 40 in gold to the ton. One body is porphyry, the other is phonolite and another is the Fox shoot. The rich ore body has not been proved up as to extent. It may be only a pocket for which that section of Bull hill has been remarkable. A month's development work will prove which.

IDAHO.

IDAHO COUNTY.

Anderson Bros. will put a new roller mill on their mine at Florence.

The Wise Boy mine has started its 10-stamp mill for the winter's run.

Notification has been received from the

Lewiston land office from Commissioner Hermann of the General Land office of the temporary withdrawal of 2,300,000 acres in Idaho and Boise counties, lying south of the present Bitter Root forest reserve, pending an investigation as to the advisability of adding the territory to the reserve. With this addition, the Bitter Root reserve will comprise 5,300,000 acres, or an area as large as the State of Massachusetts.

KOOTENAI COUNTY.

The St. Joe placers have been bought by Pittsburg men.

NEZ PERCES COUNTY.

Near Lewiston, the Eureka M., S. & P. Co., and the Fargo G. & C. M. Co., are developing copper properties on the Snake river. Electric drills are being installed by the Eureka and the Fargo is putting up a reduction plant; seventy-five men are at work. The country rock is diorite; trend of veins northeast, dip slight. The veins are capped with brown hematite iron, carrying \$20. Under the capping are copper pyrites, carrying gold and silver. The Eureka has found ores 10% copper, \$8 gold, five ounces in silver.

OWYHEE COUNTY.

The Sinker Tunnel was begun November 20, 1899, to drain War Eagle mountain, and to determine if the vein continued to the tunnel level, 2300 feet below the old workings. The tunnel site is 3 miles east of Silver City, at an altitude of 5250 feet, and has attained a length of 1½ miles.

Manager W. J. Prisk has made an average of 8 feet per day since the use of machine drills. The tunnel is 7½ feet wide bottom, 7 feet wide top, 7 feet 1½ inch high; inside grade 6 inches to the 100 feet.

SHOSHONE COUNTY.

The St. Joe Basin Placer M. Co. has bought eight claims at the headwaters of the north fork of the St. Joe river for \$95,150. Cash payment of \$2000 has been made. W. T. Hales of Wallace will be manager of the company.

The Record says that near Wallace the tunnel on the Nine Mile is in 1900 feet. Manager Flink will run another 100 feet. The Gold Standard is putting in 500 feet of 18-inch pipe to operate the hydraulic elevator.

The ore shoot in the O. K. mine at Gardner has been exposed for 300 feet. An upraise has been started.

MONTANA.

BEAVERHEAD COUNTY.

Near Wisdom the Bonanza mine's electric machinery is working.

Manager W. B. Stanchfield of the Ajax mine has it in operation. Fifer and Pendleton will work the July Flower this winter.

FERGUS COUNTY.

The Gold Reef M. Co., Gilt Edge district, will put in a roasting furnace.

FLATHEAD COUNTY.

A report on the West Fisher mine, made to the board of directors of the Portage L. & C. D. Co., says: "The ore as now exposed on the property is an ideal one for milling by amalgamation and concentration. If the ore does not change in character, the proper method of treating it is as follows: Crush in stamp mill, with amalgamating plates in battery; run discharge from battery over outside plates and concentrate on Wilfley tables. There is nothing in the ore which interferes with the cyanide process of extraction. This would save freight and smelting charges on concentrates, but would be more expensive than the above method. A mill test made on an average sample from No. 0 tunnel carried \$14 gold. This test showed that 65% of the values were free, while 30% could be saved on the Wilfley tables in high concentrates, leaving a loss of only 5% in the tailings. This test shows a very high saving. The assays were as follows: Head sample, \$14; tailings, after amalgamating, \$5.60; saved by amalgamation, \$8.40; concentrates, after amalgamating eighty tons into one, \$388; tailings, after concentration, 75 cents; saved by concentration, \$4.85. This shows a saving of 95%."

GRANITE COUNTY.

The Phillipsburg Mail hears that the Granite concentrator will be enlarged and that ultimately all of the ore taken from the Granite and Bimetallic mines will be treated at the concentrator and the concentrates shipped to some smelter, until such time when the company can build a smelting plant of its own.

LEWIS AND CLARKE COUNTY.

R. A. Bell, owner of the East Pacific mine, wants plans and estimates for a 50-ton concentrator. He has on the dump at the mine 17,000 tons of ore, all low

grade, the values running from \$7 to \$10. The ore concentrates well.

MADISON COUNTY.

Near Virginia City Manager Millard of the Kennett M. Co. will use the Shafter mill until August 1, 1903, to be fitted with a concentrating plant, to operate all winter on ores of the Kearsarge mine.

MISSOULA COUNTY.

The old Sierra M. Co. has leased the Sierra claims for three years to O. C. Finkelburg for \$20,000.

F. M. Rites has bought the patents of C. M. Allen of Lolo to treat sulphide ores, and will organize a company.

PARK COUNTY.

Livingston reports the intended consolidation of the Bear Gulch M. Co. with the Gold King M. Co.

NEVADA.

ESMERALDA COUNTY.

The Alpine M. Co. has incorporated, owning numerous claims.

EUREKA COUNTY.

M. L. Requa has an option on the Ruth group of mines, near Ely.

LINCOLN COUNTY.

Manager Freudenthal of the Manhattan Co., Pioche, in the Telephone group, traversed by the Raymond-Ely ledge, says he has ore which shows 200 ounces silver, 61% lead and \$3 gold. In the Puritan group, on the original holdings of the Manhattan Co., in the shaft ores yield 71% lead, 133 ounces silver and \$2 gold per ton.

The Keystone mine, Yellow Pine, is turning out ore under the management of C. F. Schader of the German-American Co. I. E. Blake, who promoted the building of the California Eastern Railroad from Goffs to Manvel, was at the head of the Keystone mining enterprise; but, owing to the failure of the railroad and the inability to pay off all the indebtedness, the mine was attached and sold under execution. He was unable to redeem the property and it passed into the hands of the people represented by Mr. Schader.

The mill of the Duplex & Searchlight is crushing thirty tons daily. Water is supplied by an electric pump at the 400 level in the shaft. Manager F. P. Swindler has thirty men at work and is running crosscuts in each direction from the 400 level.

LYON COUNTY.

The North Rapid mine at Como is closed down on account of the inclement weather. A large mill was in course of construction.

NYE COUNTY.

B Cramp of Philadelphia is reported to have bought the old Liberty mine, 25 miles from Tonopah, for \$60,000.

G. F. Hensel of Haverford, Pa., has bought for himself and H. Clothier of Philadelphia the Molly group, near Butler, for \$60,000.

The shaft of the Ohio-Tonopah is down 320 feet.

The Halifax-Tonopah Co. will sink a shaft 600 feet.

The main shaft of the Montana-Tonopah is 310 feet deep and is going down 5 feet per day.

STOREY COUNTY.

At Virginia City the Gold Canyon Tunnel Co. has organized to drain the mines of the Gold Canyon section lying between the Alta at Lower Gold Hill to the Dayton at Silver City. The proposed tunnel will be about 8300 feet long to connect with the south lateral branch of the Suro tunnel at the Alta shaft, all of the water being drained through the old Suro tunnel.

WASHOE COUNTY.

The Con. Nevada M. Co., Wedekind district, is sinking on the Anna Belle. A shaft house will be erected, the present one being used for an ore house.

At Steamboat C. M. Sain has bonded eighty acres—first payment of \$50,000 to be made in six months, \$100 per month paid in advance on the first of every month until the first payment of \$50,000 is made.

NEW MEXICO.

GRANT COUNTY.

The Copper Queen Con. M. Co. of New York has incorporated at Santa Fe; headquarters, Bisbee, Ariz. The company will also have an office at Fierro. C. P. Cramer is agent at that point.

Negotiations are under way for a smelter of 100 tons capacity at Silver City.

The International S. & R. Co. is incorporated; W. H. Miller, L. W. Britting, R. H. Batchelor, M. F. Bollen, Lordsburg, the business to be carried on in Grant county.

SIERRA COUNTY.

The Hillsboro G. M. & M. Co. and the Snake and Opportunity people have consolidated their interests and the two groups will be operated under one management.

The Oliver M. Co. of chloride is receiving mining and mill machinery. The company has power drills and is about to begin a tunnel 1000 feet long.

TAOS COUNTY.

The new smelter of the Fraser Copper Co., Rio Hondo district, is in operation. Manager O. H. Stanley, American Con. M. Co., says he will build a concentrating mill, fifty tons daily capacity.

OREGON.

BAKER COUNTY.

At Prairie City J. W. Bonta and associates of Philadelphia have bought from Cleaver Bros. the Oregon Wonder and Will Cleaver groups, the former consisting of thirty-seven and the latter of twenty-one claims.

At the Payche mine, Greenhorn district, a 20 stamp mill is in operation.

Manager J. M. McPhee of the Golden Wizard, Deer Creek district, will put in a reduction plant, capacity 100 tons a day, and a station pump, capacity 1000 gallons a minute.

JOSEPHINE COUNTY.

Placer mines have water sufficient to start. All expect to get in a longer season of work and get out more gold this season than they have done for many years.

A 4-stamp mill goes in the Kramer quartz mine, Mount Reuben district.

The Rogue River M., M. and D. Co., has incorporated at Grants Pass, J. F. Brennan, L. Brennan and C. Berry.

Los Angeles and Redlands, Cal., men have bought the Dowden gold mine and Braden mill, near Medford, for \$100,000.

PENNSYLVANIA.

SCHUYLKILL COUNTY.

The anthracite coal miners' dispute with the operators, which was made the subject of arbitration, is likely to be settled by the miners securing an increase of 5% wages, a nine-hour day, and yearly agreements between the men and the company which employs them. The arbitration committee will meet again on Dec. 3, when it is expected negotiations will have progressed sufficiently to have the whole matter definitely settled.

SOUTH DAKOTA.

LAWRENCE COUNTY.

During October the Spearfish M. & M. Co. produced \$22,000, with two idle days at the mill, owing to the non-arrival of acid. The Spearfish Co. are still drifting on the ore body on the Johnson gulch side of the property in the direction of the old Black Diamond workings. In the breast of the tunnel the ore body is 10 feet wide and the ore will mill \$7 per ton. The Spearfish Co. can mine and treat ore running as low as \$3 50 per ton.

UTAH.

BEAVER COUNTY.

At the Majestic Manager Farish will sink a main shaft through which the output of the entire group is to be ultimately discharged to a depth of 800 or 1000 feet.

Near Milford, the Wasatch M. Co. has sold their property to Evans & Lathrop of Salt Lake for \$25,000. They have let a contract and crosscutting has begun from the bottom of the main shaft.

EMERY COUNTY.

The Copper Globe M. Co.'s property is now owned by W. R. Pike of St. George. The Copper Globe properties were located in 1899, in a sandstone formation, the richness of some of its surface ores commanding attention. Bodies of low-grade copper ores have been exposed by tunnel workings, but could not be worked on account of lack of transportation facilities.

GRAND COUNTY.

In the La Sal country, near Basin, a St. Louis company, will work the Skylark group. Work starts next week on the Iowa group, Gold hill. The new 100-ton smelter at the Paradox-La Sal mines is ready to blow in.

IRON COUNTY.

At the Ophir Co.'s properties, the cyanide process is being substituted for the Russell lixiviation process. The new plant has twelve tanks, a crushing capacity 150 tons daily. At the Johnny the new mill is being completed and will be ready to receive ore.

JUAB COUNTY.

Near Eureka, the Emerald mine reports pay quartz on the 700-foot level. Ore shipments from the Tintic district

during the week amounted to seventy-seven carloads, divided among the mines as follows: Bullion-Beck, nine; Eagle & Blue Bell, three; Gemini, thirteen; May Day, two; Yankee Con., seven; Uncle Sam, three; Star Con., one; Lower Mammoth, seven; Mammoth, ten; Mordue Iron ore, one; Grand Central, five; Dragon Iron mine, sixteen. The Mammoth mill also shipped two carloads of concentrates.

Noar Tintic Superintendent Williams, Spy mine, is driving a drift from the 700 level to connect with the Ajax tunnel. This will give an outlet for the ore on the other side of the mountain.

The Utah mines at Fish Springs have thirty men at work.

Manager Geddes of the Swansoa, near Silver City, will furnish 2000 tons per month silver-iron ore to the Bingham Con. smelter. The South Swansea will be enabled to resume.

SALT LAKE COUNTY.

The blowing out of the Germania's furnaces causes T. R. Jones, its former manager, to tell the Tribune that that was the first time it had been voluntarily done since they were blown in just thirty years ago by the founders. Since that time he estimates that bullion of the value of nearly \$200,000,000 has been drawn from its furnaces, the greater portion of it produced during his administration as general manager.

W. S. Hall, superintendent of the Copper Belt, tells the Bulletin the road is now hauling about 500 tons of ore daily—300 from the Commercial (Bingham Con.) and 200 from the Columbia and other mines.

Superintendent W. R. Smith of the Highland Boy says the tunnel making for the Leonard vein has less than 50 feet to go, and before the end of November should cut it, at 500 feet vertical depth. The tunnel is following a cross fissure and at contact, according to indications in upper workings, should break into a large ore shoot.

SUMMIT COUNTY.

The Ontario mine of Park City reports a new ore body at a depth of 2000 feet, carrying lead, silver and zinc.

Superintendent Keely will have charge of the Consolidated Silver King extension and Bogan properties at Park City.

Manager Treweek projects continuing the Wabash shaft, Park City, to a depth of 1200 feet.

TOOELE COUNTY.

A gasoline hoisting plant goes to Ophir for the Montana Con. Manager P. Ryan has the shaft down 300 feet and will resume sinking. The company's ground, consisting of sixteen claims, is now all patented.

The cyanide plant, Sunshine M. Co., Camp Floyd district, has been closed down to install a slimes plant. Manager Moore says general repairs and alterations will also be made.

WASHINGTON.

FERRY COUNTY.

At Republic the California w11 be sunk to the 500-foot level. Shipments of two cars a week go to Nelson, averaging \$1500 to the car, about twenty-five tons each.

Four cars of ore were shipped from the Quilp last week, working force twenty-six men. The Great Northern Railroad has completed its spur.

About 200 men are at work in Republic. Of this number, the Quilp has 30, the Morning Glory 6, the Black Tail 10, the Lone Pine-Surprise 10, the Trade Dollar 10, the San Poll 10 and the California 30.

YAKIMA COUNTY.

Work on the shaft of the Elizabeth G. M. Co., Gold Hill, has shut down for the season. A depth of 400 feet was reached.

WYOMING.

CARBON COUNTY.

Saratoga reports 360 mining claims adjoining the Ferris-Haggarty copper mine at Battle Lake, acquired by Salt Lake and Wyoming men for \$150,000. Among the members of the new company are C. D. Clark of Evanston, C. H. Fishback of Rawlins, T. Kearns, J. E. Bamberger, D. Keith, S. Newhouse and W. H. Dickson.

FOREIGN.

BRITISH COLUMBIA.

Near Aspen Grove is Camp Hedley, on Twenty Mile creek, predominating mineral gold. The principal property is the Nickel Plate mine, M. K. Rogers manager. He is erecting a 40-stamp mill. When a railway is built his people will erect a smelter.

J. N. Greenhields, principal shareholder Montreal & Boston Copper Co., owning the Sunset mine and smelter at

Boundary Falls, says the second furnace will be in operation Dec. 15; a third furnace will be built, set up and in operation by Feb. 15, 1903. The power plant at Boundary Falls is being enlarged to give power sufficient for five furnaces, which capacity will be reached.

At Sandon, on the 21st, a representative meeting of the silver-lead miners of East and West Kootenay, resolved that a protecting tariff on imported lead ores, pig lead and its products is desirable, subject to the conditions that it be clearly shown and assurance given that such tariff will be of direct benefit to the silver-lead miner rather than the smelters and refineries only, and recommended that lead bullion smelted and refined or otherwise treated in bond in foreign countries be readmitted to the dominion of Canada upon the payment of an ad valorem duty of 15% of the cost of smelting and refining, corroding or other process of manufacturing.

The Trail smelter deducted 10% from the silver values of the last shipment from the Capella property at New Denver. It is a dry ore, carrying black sulphurets of silver which give high values. This is stated to be the heaviest deduction that has ever been made by any smelter in that country.

The Ymir mine during October ran fifty stamps 29 days 14 hours; estimated profits on operating, \$3000 after deducting \$3082 for development.

Michel announces that the strike of the coal miners of the Crow's Nest Coal Co. at that point has been settled, and that the miners have resumed work.

Wm. Thompson, manager Rossland-Kootenay mines, speaking of cost in British Columbia of mine supplies, says Eastern Canada has been fostered at the benefit of British Columbia, and submits statistics indicating the differences between the prices of mining supplies at Rossland and in the Cœur d'Alenes, which difference is due entirely to the customs duties:

	Wallace, Idaho.	Rossland, B. C.
Wire nails.....	\$3 50	\$4 00
Drill fittings, discount off list.....	20%	None
Air drill hose, per foot	42¢@45c	50¢@60c
Stearic wax candles, per 40 sets.....	4 95	6 00
Triple tape fuse, per case of 6 M feet.....	20 00	28 00
Gutta percha fuse, per case of 6 M feet.....	20 00	28 00
XXXX hasting caps, per 1000.....	6 60	9 00
XXXXXX blasting caps, per 1000.....	8 00	10 00
Atlantic red engine oil, per gallon.....	26	36
15" cold test oil, per gallon.....	21	35
Air cylinders, per gallon.....	33	44
Capital cylinders, per gallon.....	44	52
Dynamite (large consumers)—		
40% per 100 lbs.....	12 20	16 00
60% per 100 lbs.....	15 70	19 00
Dynamite (small consumers)—		
40% per 100 lbs.....	13 00	16 50
60% per 100 lbs.....	17 50	19 50

Mr. Thompson adds, as a result of the tariff on the kind of oil used, the Rossland mines paid 20% to 25% more for the product than did the Cœur d'Alene mines, although the Standard Oil Co. controlled the Canadian supply as effectually as they did the American article. Replying to a query as to the powder supply, he states that it is largely a matter of preference. His miners preferred American powder, claiming that it generated less fumes than the Canadian powder, and he accordingly uses American powder.

In the Similkameen district, at Aspen Grove, the Bates Bros.' claims—the Big Dutchman and the Golden Sovereign groups—have been bought by Terre Haute, Ind., men for \$135,000 cash. The Big Dutchman group has a defined lead carrying copper glauc and native copper. On the Golden Sovereign group, adjoining, native copper has been found. The Aspen Grove camp in the Similkameen mining district, elevation 3500 feet, is on the line of the proposed Canadian Pacific railway extension from Spences bridge to Princeton.

MEXICO.

CHIHUAHUA.

J. R. Roslyn will operate the Santo Domingo placers, Concha river, 80 miles east of the city of Chihuahua, by steam shovel and sluices. He thinks that the dredging methods as used in California would be better; but as the shovel method had been started by former owners and the machinery was on the ground, he has arranged to use it. The city of Chihuahua is the nearest railroad point at present, but the Stitwell road (Kansas City, Mexico & Orient) will go through the property.

DURANGO.

The Guggenheim Exploration Co. have acquired the mines, mineral lands, railroad and smelters at Valardena for a price approximating \$5,000,000. The property has for ten years been operated by E. W. Nash and G. C. Barton. It is reported to be rich in gold, silver, copper and lead. The actual producing mines in operation on the property, it is stated, number about 200. Some of these have been worked for 200 years. The Guggenheim purchase is practically an entire mining camp including the town of Valardena. It has a population of about 50,000 people, all employed by or dependent upon the mines and smelters at that place.

GUANAJUATO.

The La Luz Mines Co. of Denver and Boston own property in Guanajuato mining district and will commence January 1 on its new mill, to be located at the property, to be equipped with forty stamps and have a minimum capacity of 100 tons a day.

MONTEREY.

After having been shut down for a year the Sierra Mojada mining properties, owned by the Guggenheim interests, are to be reopened. A few shipments of ore, taken out before the mines were shut down, have already been made to Monterey, and sufficient to keep a force busy for several weeks is still on the dumps. It is expected that by December 1 the mines again will be in full operation. The mines were purchased by the Guggenheim Exploration Co. eighteen months ago.

SONORA.

The Sonora Quartz M. & D. Co., operating in the District of Altar, have installed a pipe line and pumping station to furnish a water supply to their mines and camp. The plant pumps 100,000 gallons daily.

At Minas Prietas the Grand Central M. Co. is prospecting with a derrick and well drill, intending to sink 1200 feet by that method. If results prove satisfactory, a shaft will be sunk.

During October the manager says the shipments of silver from the mines of the Bufo M., M. & S. Co. aggregated 75,000 ounces. He expects these shipments to continue until the rainy season, next June. The Bufo Co. employs 1500 mules in freighting.

SOUTH AMERICA.

UNITED STATES OF COLOMBIA.

W. H. Ashwell, T. J. Quinn, T. Clinton and S. H. Wright of Detroit have organized the Cauca Valley Con. Mines Co. and are at work on the properties and will have three sets of 3,000,000-gallon pumps. To dig ditches in the country would be expensive and the water rate and undergrowth would make it cost as much annually to keep them open as it would to dig them. At present the natives are mining in a small way, washing out the gold by hand on their claims, and have great difficulty in getting supplies. The placer claims have already paid for the property and the last return was twenty-three pounds of gold.

SPAIN.

The Cerro Murlano chalcocopyrite mines, 10 miles from Cordova, which are being explored by a British company, are found to have been worked out by the Romans to at least 400 feet in depth, in spite of the large quantity of water which had to be raised.

Commercial Paragraphs.

THE National Drill & Mfg. Co., 530 National Life Bldg., Chicago, Ill., have begun the manufacture of mining machinery.

THE B. F. Nell Co., 4013 Wentworth Ave., Chicago, Ill., have begun the manufacture of filter presses for metallurgical and other uses.

THE American Engineering Works are making special rifle screens suitable for placer mining work and would be glad to figure on an extension of this line of work.

THE Link Belt Machinery Co. of Chicago are erecting an extension to their wrought iron and sheet iron department building. It covers 336x125 feet and will give them most advantageous space for manufacture. The company reports having orders for several dredging plants to be used in placer mining in the West.

F. L. BROWN, general manager Pacific Steel & Wire Co., has gone East. The company will establish at Oakland, Cal., a plant for the manufacture of steel and wire specialties. Among its stockholders are D. O. Mills, H. E. Huntington, I. W. Hellman, president of the Nevada National Bank; Ant. Borel of Ant. Borel & Co.; Percy T. Morgan, president of the

California Wine Association; Frank M. Smith, president of the Pacific Coast Borax Co.; Lewis E. Spear, formerly of Lewis Spear Co.; John Rosenfeld Sons' Co., and W. H. Talbot, of Pope & Talbot.

Personal.

H. BLACK is manager Kansas Union M. Co., Empire, Colo.

J. W. BURKE is foreman Spearfish M. Co., Cyanide, S. D.

E. E. BRIGGS is superintendent Mascot mine, Turret, Colo.

F. L. DWIGHT is manager Bisbee West M. Co., Bisbee, Ariz.

J. P. OWEN is manager Sierrita M. & M. Co., Oro Blanco, Ariz.

V. G. HILLS has returned to Cripple Creek from Denver, Colo.

P. SHARPE is manager Santa Cruz G. M. Co., Patagonia, Arizona.

H. D. LEMON is manager North Star mine, Custer, South Dakota.

J. LANE is foreman Olsen mine, 6 miles from Coopertown, Cal.

H. J. BARTON has returned to Oakbar, Cal., from San Francisco.

L. D. SIVYER, M. E., of Spokane, Wash., is in Los Angeles, Cal.

J. S. HURSTE is superintendent Santa Bihiana mine, Sonora, Mexico.

J. F. BURNS has returned to Colorado Springs, Colo., from St. Joe, Mo.

JOHN FILIUS of Shasta county, Cal., has gone to Boston for the winter.

MANAGER J. P. COPPEAU has returned to Iola, Kan., from Salt Lake City, Utah.

C. E. BUNKER has resigned as superintendent Keystone mine, Amador City, Cal.

E. P. ARTHUR, JR., of Cripple Creek, is in Park county, Colo., on mining business.

E. ARKELL of Denver has gone to Reno, Nev., to take charge of the Con. Nevada M. Co.

F. IRWIN succeeds Jas. Hutchinson as manager Trade Dollar Co., Silver City, Idaho.

ROBT. CHRISTIAN succeeds J. McQuillan as superintendent West End mine, Tonopah, Nev.

R. C. FACER, superintendent Camp Opportunity mine, Silver City, Idaho, has gone East.

J. F. CRISMON of the Utah M. Co. at Fish Springs, Utah, has charge of the assay furnaces.

A. CHALMERS is superintendent of the Sultana mine, Angels, Cal., vice C. H. Morgan, resigned.

C. E. HOTALING succeeds E. F. Stuart as master mechanic Trade Dollar mine, Silver City, Idaho.

J. E. BESS succeeds Superintendent Lohnnie at the Maxwell mine, Cracker Creek, Baker county, Or.

C. H. MORGAN has resigned as superintendent Sultana mine, Angels, Cal., and has gone to Lundy, Cal.

J. J. HOBAN, manager the Argus of Idaho Springs, Colo., has gone East to visit relatives and on business.

CURTIS H. LINDLEY has returned to San Francisco from the transaction of legal business in the Coeur d'Alenes.

M. D. THOMAS, former foreman Trinity Copper Co. mine, goes to Bully Hill as foreman of the Bully Hill mines.

R. S. ROSE of Marquette, Mich., is at Pierce, Idaho, examining mining property in the interests of Michigan people.

S. A. PARNALL bought the Americano mine, Terrazas, Chihuahua, Mexico, and will make El Paso, Texas, his home.

B. W. BEGER has resigned the superintendency of the Last Chance mine, Mogollon, N. M., and returns to Denver.

A. HOOVER has resigned from the Santa Rita Con. M. Co., and will be mine superintendent Cumaral mines, Sonora, Mexico.

A. J. PRITCHARD of the Coronation M. Co. of Seattle, Wash., has gone to Coronation Island, Alaska, on company business.

A. B. HAMILTON, manager Ramhler mine, Grand Encampment, Wyo., has returned from a visit to Beaver county, Utah.

P. GINTHER is manager Encinillas mines, operating the Dolores y Anexas mines, 45 miles from Santa Rosalia, Chihuahua, Mexico.

W. S. MANN, formerly superintendent Thayer M. & M. Co., Miramar, Costa Rica, is now assistant superintendent Sheep Creek, Alaska, mines.

C. B. ROGERS is manager of Modoc mine and dry concentrating plant, Las Cruces, N. M., former superintendent Old Dominion mine, Globe, Arizona.

W. H. JACKSON, former superintendent Golconda and Belcher mines, has the same position with the Cracker-Eagle and Cracker-Summit Cos., Sumpter, Or.

R. V. DANIELS, collector of customs Naco, Ariz., has resigned, to devote his time to the business of the Gold Treasure M. Co., of which he is secretary and treasurer.

G. G. VIVIAN has gone to Sultepec, Mexico, to resume management of the Hidalgo M. & S. Co. property, which includes a fifty-ton smelter and silver and lead mines.

W. A. BATEMAN of Calumet, Mich., is in Bisbee, Arizona, to close the deal with G. Baron for the property in Montezuma canyon, Huachuca mountains, Cochise county, Arizona.

P. S. COULDREY will be the manager Le Roi No. 2 Co.'s mines, Rossland, B. C. Mr. Couldrey has had charge of copper mines in Spain and of copper and lead mines in Germany.

W. M. H. WOODWARD of Silver City, New Mexico, has gone to Porto Rico, U. S. A., to examine the mineral possibilities of the island and will establish the first complete assaying and analytical laboratory in Porto Rico.

G. R. ADAMS has resigned the superintendency of the Oquirrh-Bingham Co., Bingham, Utah, and goes to South Africa at a salary of \$2000 a year. H. A. Brown, late of the Creole mine, Park City, Utah, succeeds Mr. Adams.

J. J. MCSORLEY has resigned the superintendency of the What Cheer mine, Calaveras county, Cal., and has gone to Calaveritas, Cal., where he has the management of another mining property. H. J. McSorley succeeds him as superintendent of the What Cheer.

J. L. HARRIS, superintendent Quincy mine, Houghton, Mich., whose resignation was to take effect Dec. 1, goes to New York. Superintendent Robert of the Adventure mine there, who also was to retire Dec. 1, will stay on, as H. A. Allen has reconsidered acceptance of the management of the Adventure. Superintendent Key of the Adventure mill has resigned.

Obituary.

AT Park City, Utah, D. Gillis, the veteran foreman of the Silver King mine, died on the 18th inst. from injuries received while on duty in the mine.

ARTHUR H. COLLINS, general manager Smuggler-Union mine, near Telluride, Colo., was murdered by an assassin on the 21st inst., being shot in the back through a window as he sat in the company's club room. He died on the 22nd. Mr. Collins was president Colorado Mine Owners' and Managers' Association. The assassin has not yet been found.

TITUS MOLITOR, the oldest assayer in the Black Hills, died at Deadwood, S. D., on the 16th inst., aged 68 years. Born in Hungary, he came to the United States in 1859, taking an interest with his brother, J. Molitor, of Molitor & Co., San Francisco, at the time a prominent assaying firm and acting as mint for the United States in the coinage of the \$50 gold slugs. With his brother, S. Molitor, he opened the first assay office in Montana, in 1864, and operated a silver smelter there for a time.

Catalogues Received.

Sixty pages, black and silver binding, with gold sulphurets interspersed throughout the texture thereof, comprise the latest catalogue of Heald's School of Mines and Engineering, 24 Post street, San Francisco, Cal., with good argument for such instruction, illustrations of what students can do, and detailed information as to the school's progress and purpose.

"Underground Wire Rope Haulage" is the title of a treatise on that important subject of interest to mine workers, illustrating the economical application of wire rope haulage to underground work, the engravings adding much to the value of the work. The cuts showing the special arrangement for curves, a horizontal guiding sheave, and the position of the rope with a train approaching, are unique and of special interest. The booklet will be mailed on request by the authors, the Broderick & Bascom Rope Co., 809 N. Main St., St. Louis, Mo., or their Eastern representative, F. Baldwin, 33 South St., New York City, N. Y.

New Patents.

DEWEY, STRONG & CO.'S SCIENTIFIC PRESS PATENT AGENCY, 330 Market St., S. F., has official reports of the following U. S. patents issued to Pacific coast inventors:

FOR WEEK ENDING NOVEMBER 18, 1902.

713,940.—WIRE SPLICING MACHINE—J. Barron, S. F.
713,843.—SALESMAN'S LIFT—C. A. Bouck, Los Angeles, Cal.
713,951.—HYDRANT—C. L. Burkhardt, Dayton, Wash.
713,919.—GRAFTING—J. B. Burrell, Wrights, Cal.
713,950.—GRAFTING—J. B. Burrell, Wrights, Cal.
713,750.—EXCAVATOR—W. Cole, S. F.
714,102.—CLOTHESLINE PROP—S. J. Day, Los Angeles, Cal.
713,623.—CHAIR FOOT REST—J. C. Garrett, S. F.
713,762.—TENNIS SET HOLDER—O. Haskell, San Rafael, Cal.
713,638.—PUZZLE—W. Hepfinger, Montebano, Wash.
713,775.—BOTTLE CONVEYOR—Kuehnrich & Larsen, Los Angeles, Cal.
714,001.—CLOTHES DRIER—F. S. McDougall, Seattle, Wash.
713,902.—OIL BURNER—J. H. Morrissey, S. F.
713,793.—EXPLOSIVE ENGINE—J. A. Ostenberg, San Jose, Cal.
713,799.—POULTRY FOUNTAIN—J. Reed, Berkeley, Cal.
714,038.—PROCESS—J. A. Russell, Tacoma, Wash.
714,016.—AMPERE-HOUR METER—W. A. Sherlock, S. F.
713,719.—HAND TRUCK—W. G. Tower, Corona, Cal.
713,723.—WELL ROPE PROTECTOR—T. R. Vincent, Berkeley, Cal.

Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

AUTOMATIC POULTRY FOUNTAIN.—No. 713,799. Nov. 18, 1902. J. Reed, Berkeley, Cal. The invention relates to improvements in poultry drinking fountains; and its object is to provide a cheap, simple, indestructible and economically operated device which will automatically fill, cleanse and refill itself and in which the water will always be clear and pure, thereby avoiding to a very great extent disease among the fowl. It consists in the combination in a poultry fountain of horizontally disposed drinking pans pivoted rearward of their center of gravity, said pans having their bottoms inclined upwardly and rearwardly, overflow vents at the back ends of said pans, said pans tilting automatically when the water rises to the level of said vents, water supply means above said pans, a casing inclosing said water supply means and said pans except for a drinking space above said pans forward of their pivots, and projections on the wall of the casing rearward of said drinking space extending downwardly into the pans.

HYDROCARBON BURNERS.—No. 713,902. Nov. 19, 1902. J. H. Morrissey, San Francisco, Cal. This invention consists of a shell or casing inclosing separate and concentric oil and steam passages, pipes entering said passages, a plug movable centrally of said casing, a flanged head on said plug, a cap fitting the discharge end of the casing, said cap and plug movable in relation to each other and to the discharge orifices of the oil and steam passages, whereby the vapor supply to the furnace is regulated, and a central air passage through said plug, whereby a current of air may be fed to the casing and steam. It also comprises a novel means for combining the burner with a furnace and regulating the feed of hot and cold air drafts and other details of construction.

Latest Market Reports.

SAN FRANCISCO, Nov. 26, 1902.

METALS.

SILVER.—Per oz., Troy; London, 22½d (standard ounce, 925 fine); New York, bar silver, 47½c, refined (1000 fine); San Francisco, 47½c; Mexican dollars, 38½c San Francisco, 37½c New York.

At these figures \$2 66 Mexican silver is required to buy one American gold dollar.

The Mexican Government has advices regarding the adoption of a gold standard from Europe and the United States. The effect of the continued decline in the price of silver upon the currency of the Philippine has led to the opinion that Congress at its next session should provide a currency of stability for the islands. Financiers are asking: "What is going to happen, not only to the silver countries, but to others in which silver is largely used as a circulating medium, if the price of silver continues to decline?"

China has to collect the indemnity from subjects in silver, trade it for gold, pay exchange and then pay another brokerage to get silver back. Every time China pays a part of the indemnity she slices off part of herself. The result may be that, long before the indemnity is paid, China will be either bankrupt or must repudiate. It is thought that the steady decline in the price of silver will have no material effect on the financial situation in the United States.

COPPER.—New York: Standard, \$10.50@10.75; Lake, 1 to 3 casks, \$11.55; carload lots, \$11.35; Electrolytic, 1 to 3

casks, \$11.35; carload lots, \$11.20; Casting, 1 to 3 casks, \$11.35; carload lots, \$11.00. San Francisco: \$14.00. Mill copper plates, \$17.00; bars, 18@24c. London: £50 is 3d spot per ton.

Advance sheets from Stevens' Copper Handbook for 1902, which will be out in January, show that the production of copper has been materially decreased in countries outside of the United States, Canada and Mexico. The production in Spain and Portugal is not materially affected, as the mines which have been closed down were mostly small ones. The German production shows only a slight decrease, but in Chili, Australia, Tasmania and other important copper fields many mines have been compelled to cease operations on account of the low price of copper now prevailing.

The production in the United States, Canada and Mexico, however, shows a decided increase, and the handbook estimates that the world's output will show an increase of about 40,000 tons, or about 8%. This is slightly under the normal rate of increase for a number of years past.

The increase in Canadian production is from the group of mines in British Columbia and the Boundary Creek districts, including the Granby, the Montreal & Boston and the British Columbia mines. The Boundary Creek district produced 99,730 tons of ore in 1900, 369,618 tons in 1901 and up to Nov. 1 this year 410,894 tons. The Granby mine has increased its output over last year by about 28,000 tons, the British Columbia by 12,000 tons, and the Montreal & Boston increased production is about 1500%.

The large increase in the Mexican production is due to the Greene Consolidated mine.

LEAD.—New York, \$4.12½; Salt Lake City, \$3.50; St. Louis, \$4.00; San Francisco, \$4.50, carload lots; 4½c 1000 to 4000 lbs.; pipe 5½, sheet 6, bar 5½c; pig, \$4.75. London: £10 13s 1d per ton.

SPELTER.—New York, \$5.25; St. Louis, \$4.50; London, £19 7s 6d per ton; San Francisco, ton lots, 6½c; 100-lb lots, 7c.

ANTIMONY.—New York, Cookson's, 9½c; Hallett's, 8½c; San Francisco, 1000-lb. lots, 10c; 300 to 500 lbs., 11c; 100-lb. lots, 13@15c.

TIN.—New York, pig, \$24.50; San Francisco, ton lots, 28c; 500 lbs., 28c; 200 lbs., 28½c; less, 29c; bar tin, \$ 1b, 32½c. London, £112 spot.

PLATINUM.—San Francisco, crude, \$18.00 per oz.; New York, ingot, \$19.00 per Troy oz. Platinum ware, 75@80c per gram.

QUICKSILVER.—New York, \$48.00 large lots; London, £8 15s; San Francisco, local, \$46.00 per flask of 76½ lbs.; Denver, \$49.50. Export, \$44.50.

BABBITT METAL.—San Francisco, No. 1, 10c; No. 2, 7c; No. 3, 6½c; extra, 17½c; genuine, 35c; Eclipse, 37½c.

ALUMINUM.—New York, No. 1, 99½c pure ingots, 35c; No. 2, 90½c, 30c to 34c.

SOLDER.—Half-and-half, 100-lb. lots, 18½c; San Francisco, Plumbers', 100-lb. lots, 15½c.

NICKEL.—New York, 50@60c per lb.; ton lots, 45@48c.

STRUCTURAL MATERIALS.

IRON.—Pittsburg, Bessemer pig, \$24.00; gray forge, \$21.15; San Francisco, bar, 3c per lb., 3½c in small quantities.

STEEL.—Bessemer billets, Pittsburg, \$28 and \$30.00; open hearth billets, \$31 and \$34.00; San Francisco, bar, 7c to 12c per lb.

CHICAGO CURRENT QUOTATIONS.

Bessemer.....	\$25.00@25.50
Foundry Northern 1.....	24.50@25.50
Northern 2.....	24.00@25.00
Northern 3.....	23.50@24.50
Southern 1.....	24.65@26.15
Southern 2.....	24.00@25.65
Southern 3.....	23.65@25.15
Forge.....	23.15@24.65
Charcoal.....	26.00@27.00
Billets, Bessemer.....	33.00@34.00
Bars, iron.....	1.85@1.90
Bars, steel.....	1.75@1.80
Rails, standard.....	28.00@30.00
Rails, light.....	34.00@40.00
Plates, holler.....	1.90@2.00
Tank.....	1.75@1.80
Sheets, 26 store.....	2.95@3.00
No. 27.....	3.05@3.10
No. 28.....	3.45@3.60
Angles.....	1.75@1.80
Beams.....	1.75@1.85
Tees.....	1.80@2.00
Zees.....	1.75@2.25
Channels.....	1.75@2.25
Steel melting scrap.....	19.50@20.00
No. 1 railroad wrought.....	20.00@21.00
No. 1 cast, net ton.....	17.50@18.00
Iron rails.....	24.50@25.50
Car wheels.....	21.00@22.00
Cast forgings.....	10.50@11.00
Turnings.....	14.50@15.50

CEMENT.—Germania, \$3.00; K. B. &

MINING AND SCIENTIFIC PRESS

Whole No. 2211.—VOLUME LXXXV.
Number 23.

SAN FRANCISCO, CAL., SATURDAY, DECEMBER 6, 1902.

THREE DOLLARS PER ANNUM.
Single Copies, Ten Cents.

The Tread-Kill Cinder Car.

There is in use at the Youngstown, Ohio, works of the National Steel Co. a new design of cinder car which was built by M. H. Treadwell & Co., 95-97 Liberty street, New York, at their Lebanon, Pa., works. This car is used for conveying molten cinder from blast furnaces to the dump. The object of the construction of this car is to enable the ladle to turn on its axis by the use of intermeshing gears. The racking device can be operated by one man. The ladle, when full, can be turned on its axis to either side and dumped so as to empty its contents clear of the track in two minutes. The general design is intended to reduce to a minimum the possibility of dismemberment of the parts, due to shocks received in coupling, or unavoidable collisions. The steel underframes or connecting girders, which connect the end frames on each truck, serve to make the body of the car one continuous member, eliminating or distributing the disproportionate strains.

The illustration shows the car with the ladle in an upright position when full of cinder or when empty after contents are dumped. The operating device consists of a cut wrought iron worm running in cut cast steel worm wheel. The operator revolves the hand wheel on its shaft. This shaft has the driving pinion attached; this pinion meshes in the spur gear on the end of the worm shaft, which in turn drives the worm wheel, which is keyed to the ladle bale concentric with the rolls on its ends. This movement tips the ladle and at the same time causes it to travel sidewise, so that the contents when dumped entirely clears the ties. To prevent the ladle from getting out of alignment a rack is attached to each side of each runway, and gear segments, which mesh with these racks, are keyed securely to the rolls.

The most radical departure is found in the fact that none of the parts are of special construction, and all are interchangeable. The car is equipped with diamond trucks, standard chilled cast iron wheels on steel axles, brass wedges, car boxes, springs, etc., also steel truck bolsters and automatic couplers, allowing substitution of any ordinary standard articles of this class. The ladle is of



The Tread-Kill Cinder Car, Showing Ladle in Upright Position.

standard size, constructed of heavy plate steel and provided with cast iron lining. The height and length of the car are practically standard with those now in use. The actual weight of this car is 60,000 pounds, its capacity being 200 cubic feet, or sixteen tons of molten cinder.

Box Electric Rock Drill.

In the Box electric rock drill, herewith illustrated, the mechanism is simple and designed to be effective. It will be noted that there is one single crankshaft with a gear on one end and a pinion on the other. The gear is driven by the pinion on the armature shaft of the motor. The crank imparts motion by means of a connecting rod to the crosshead. The crosshead is a hollow plug moving back and forth in one end of the cylindrical interior of the drill casing. The crosshead is connected by a spring to a solid plug in the cylindrical interior, which plug follows the motion of the crosshead through a longer range, with the expressed intent that what is accomplished

by a heavy mass moving at a comparatively low velocity in some other drills shall be accomplished in this drill by a slight mass moving at a high velocity, with attendant advantages of light moving parts, small power expenditure, little jar or shock, and minimum wear.

The pinion at the end of the crankshaft drives the chuck through a set of gears, and as the gears are proportioned for a power ratio of about 100 to 1 the twisting force at the chuck is manifestly great.

In Fig. 2 can be seen the steel tube which is placed over the drill and through the shell of which tube the water is supplied. The tube holder, plainly seen in this figure, serves also to effect the water connection with the water supply. By this water tube scheme an intense and concentrated washing action is designed to be produced to drive everything before it and out of the drill hole, the tube also to act as a guide to the drill steel. The method of holding the drill steel in the chuck is noted in Fig. 3. The drill steel has a notch cut in the side, and when the steel is inserted in the round hole of the chuck the chuck

block, seen raised in the illustration, with hand pin left sticking in it, is dropped into the notch. The steel is thus held loosely, the same as in hand drilling. The drill is made and supplied by the Denver Engineering Works of Denver, Colo., who say that it has been under continuous observation in their shops for two years and was afterwards subjected to tests under practical working conditions in the mines wherein existed the hardest kind of rock, and one most difficult to drill, with excellent results.

THE index to the contents of this paper for each volume is also a good index to the kind of people who read it — intelligent, practical, progressive, and possessed of money to buy what they see advertised therein.

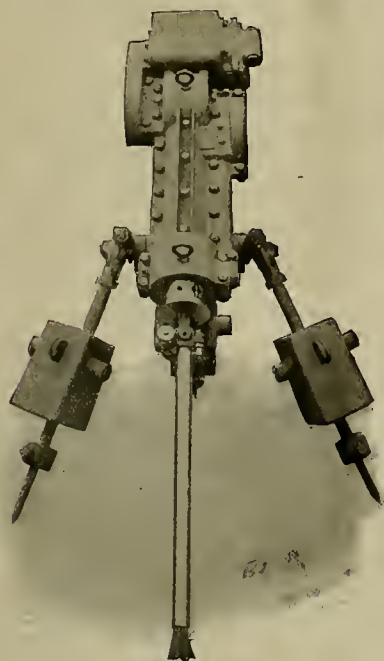


Fig. 1—Box Electric Rock Drill.

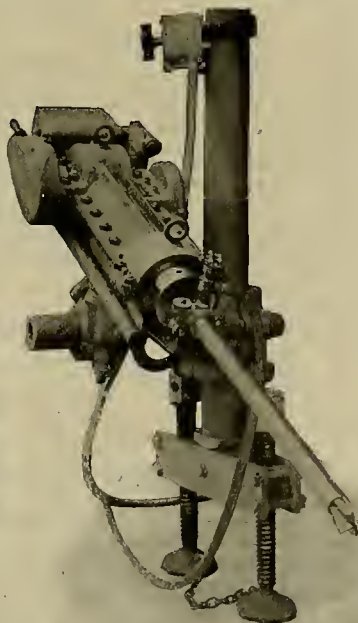


Fig. 2—Box Electric Rock Drill "Set Up," Complete.

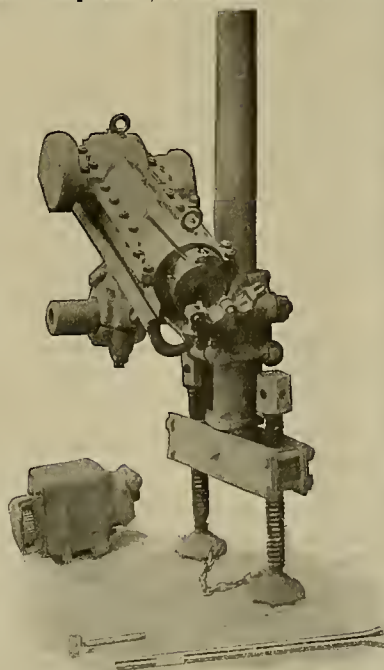


Fig. 3—Box Electric Rock Drill, With Motor Removed.

MINING AND SCIENTIFIC PRESS.

ESTABLISHED 1860.

Published Every Saturday at 330 Market St., San Francisco, Cal.
TELEPHONE, DAVIS 771.

ANNUAL SUBSCRIPTION:

United States, Mexico and Canada.....\$3 00
All Other Countries in the Postal Union.....5 00

Entered at the San Francisco Postoffice as second-class mail matter.

Chicago Office (Telephone, Harrison 73)737 Monadnock Block.
Denver Office (Telephone, Olive 733).....606 Mack Block.

J. F. HALLORAN.....Publisher.

San Francisco, December 6, 1902.

TABLE OF CONTENTS.

ILLUSTRATIONS.—The Tread-Kill Cinder Car Showing Ladle in Upright Position; Box Electric Rock Drill; Box Electric Rock Drill "Set Up," Complete; Box Electric Rock Drill, with Motor Removed, 320. Ground Plan of California Hydraulic Mine; Section of California Hydraulic Gravel Mine, 324. Double Cylinder 75 H. P. Crude Oil Engine, 325. Hoisting Engine at "Old Sump Shaft," Dolcoath, Cornwall, England; A Cornish Stamp Battery, Camborne, Cornwall, England, 325. Sturtevant Centrifugal Crushing Rolls; Edson Diaphragm Lift and Force Pump, 327. Mining and Metallurgical Patents, 328.

EDITORIAL.—Subscribers and Advertisers; Absorption of Public Lands; "Professional Etiquette"; The Successful Miner, 321.

MINING SUMMARY.—329-330-331-332.

LATEST MARKET REPORTS.—17.

MISCELLANEOUS.—The Tread-Kill Cinder Car; Box Electric Rock Drill, 320. Concentrates, 322. Steel vs. Timber in Mine Shafts; Gold and Silver as Compared with Other Mineral Products; The Setting of a Boiler; Something New in Rock Drilling, 323. Low-Grade Gravel Property, 324. Cheap Power for Mining; The Thermo Hyperphoric Process; Cleaning Out a Steam Boiler; Operation of a Good Compressor; An Economical Mining Method Required, 325. The Cornish Stamp Mill; Danger in Thawing Giant Powder; Uralite, 326. Sturtevant Centrifugal Crushing Rolls; The Simpson Tunnel; Edson Diaphragm Lift and Force Pump; The Rankin Process, 327. Mining and Metallurgical Patents; The Class Journal, 328. Personal; Catalogues Received; Commercial Paragraphs; Obituary; New Patents; Notices of Recent Patents, 333.

Subscribers and Advertisers.

In complimentary reference to this paper by regular readers and subscribers it is not uncommon to have it said in such letter that the writer thereof reads all the advertisements with interest and pleasure. Doubtless, too, with profit, for it is a fact not grasped by all readers that the advertisements are of equal importance in point of educational value with the other contents of each issue. Particularly is this so in the case of the MINING AND SCIENTIFIC PRESS, as the announcements of none but the best in their line appear therein.

With all due recognition of the importance and value of the practical articles enumerated in the issue of Nov. 22 as having appeared herein, specially written for this paper by the men who did the things they talked of, it may be said that many other "articles" written and published in each issue, viz: the advertisements, are equally valuable to the progressive miner or metallurgist or industrial worker. For these advertisements weekly appearing are the records of all mining and scientific progress. They tell in brief business shape of the latest and greatest achievements and advances in the arts of engineering, mining and metallurgy. The illustrated appliances with their brief reference and description give the latest and best news to the reader who can understand it. It is the experience of many a mining man that the first he heard of or knew concerning some labor-saving device or valuable invention was when he saw it in our advertising columns, which are first and foremost in telling about what is latest and newest, enabling the worker to do what is to be done with less cost or in a newer way.

Thus it is that the advertisements are "news" in the highest and best sense, telling their readers of improvements, new machines, economical methods, later styles and better devices.

It may also be said with manifest propriety that every reader of this paper will consult his own interests in buying what he may need from those whose advertisements he reads herein, for a variety of reasons. It is only the enterprising and go-ahead who advertise; they manifestly have the best, for if their non-advertising competitors had as good they would advertise too. This is as a matter of business. As a matter of reciprocity and self interest it is also the province of each reader to patronize in all ways those whose advertisements he sees, for the excellent reason that it is those advertisers who make it possible for the publisher to furnish so much in the way of reading matter fifty-two times a year postpaid for \$3. It is a patent fact that it is the money paid to the publisher by the advertisers that enables him to

weekly produce so expensive a publication, for no matter how large the circulation of such a paper may be, were the publisher obliged to solely depend upon subscription receipts and sales at the news stands, he could not make expenses. Hence as it is the advertisers that make it possible for our readers to weekly get so much for so small a price, it is but business reciprocity to buy from them.

Absorption of Public Lands.

Not since 1889 has there been such wide absorption of the public timber lands of this west half of America as has gone on in 1902. So great is the number of entries, and so widespread the evidence that the spirit of the law is being violated, that the Commissioner of the General Land Office has recommended the repeal or amendment of the law for the sale of timber and stone lands which was passed in June, 1878, and applied to the public land of Oregon, Washington, California and Nevada. In August, 1892, its provisions were extended to all the public land States. The area that may lawfully be taken under that Act by one person is limited to 160 acres. The land must be valuable chiefly for its timber (or stone), and unfit for cultivation if the timber were removed. Every entryman at the time of applying for timber land must make sworn statement as follows:

I have personally examined said land, and from my personal knowledge state that said land is unfit for cultivation, and valuable chiefly for its timber; that it is uninhabited; that it contains no mining or other improvements, nor, as I verily believe, any valuable deposit of gold, silver, cinnabar, copper, or coal; that I have made no other application under said Acts; that I do not apply to purchase the land above described on speculation, but in good faith to appropriate it to my own exclusive use and benefit, and that I have not, directly or indirectly, made any agreement or contract, in any way or manner, with any person or persons whomsoever, by which the title I may acquire from the Government of the United States may inure in whole or in part to the benefit of any person except myself.

After publication of notice for sixty days the entryman must appear with his proof either at the land office or before the county clerk nearest the land, or a near-by commissioner. There he is examined on oath and swears to a long list of answers touching the character of the land and his qualifications for taking title. Among the questions propounded is the following:

Have you sold or transferred your claim to this land since making your sworn statement, or have you directly or indirectly made any agreement or contract, in any way or manner, with any person whomsoever, by which the title you may acquire from the Government of the United States may inure, in whole or in part, to the benefit of any person except yourself?

At the foot of this deposition is a note reading as follows:

Every person swearing falsely to the above deposition is guilty of perjury, and will be punished as provided by law for such offense. In addition thereto the money that may be paid for the land is forfeited, and all conveyances of the land, or of any right, title or claim thereto, are absolutely null and void as against the United States.

Next below this comes the certificate of the examining officer in this form:

I certify that I have tested the accuracy of affiant's information and the bona fides of this entry by a close and sufficient oral cross-examination of the claimant and his witnesses, directed to ascertain whether the entry is made in good faith for the appropriation of the land to the entryman's own use, and not for sale or speculation, and whether he has conveyed the land or his right thereto, or agreed to make any such conveyance, or whether he has directly or indirectly entered into any contract or agreement in any manner with any person or persons whomsoever by which the title that may be acquired by the entry shall inure, in whole or in part, to the benefit of any person or persons except himself, and am satisfied from such examination that the entry is made in good faith for entryman's own exclusive use, and not for sale or speculation, nor in the interest nor for the benefit of any other person or persons, firm or corporation.

The officer before whom the testimony is taken is required to call the attention of witnesses to the following section of the United States statutes:

Section 5392. Every person who, having taken an oath before a competent tribunal, officer or person, in any case in which a law of the United States authorizes an oath to be administered, that he shall testify, declare, depose or certify truly, or that any written testimony, declaration, deposition or certificate by him subscribed is true, willfully and contrary to such oath states and subscribes any material matter which he does not believe to be true, is guilty of perjury, and shall be punished by a fine of not more than \$2000, and by imprisonment at hard labor, not more than five years, and shall, moreover, thereafter be incapable of giving testimony in any court of the United States until such time as the judgment against him is reversed.

From this it is manifest to any one that taking

timber land for the express purpose of selling to some individual or corporation on an understanding previously arrived at is illegal.

Another less common illegal procedure is taking of timber land under the representation that it is mineral or agricultural. Entrymen are permitted to denude the land of its timber and then clear out long before the time for final proof arrives. In some parts of the West the matter assumes the dimensions of a public scandal. The matter is here noted as it tends to illegally curtail the fast-diminishing area of mineral land and deters the prospector and miner.

"Professional Etiquette."

Some weeks ago editorial reference was made to the rising dignity and importance of the engineer, whether civil, military, mining, electrical or mechanical, the profession now being as clearly defined as in the case of law or medicine. In this regard is noted the fact that it is not considered "good form" for a doctor or a lawyer to "advertise," though we never yet knew a doctor of medicine or a lawyer who objected to mention of his name in connection with a case in which he was employed, such mention being gilt-edge "advertising."

It appears that our English brethren of the engineering persuasion consider that, inasmuch as engineering is now beginning to be recognized as one of the learned professions, the professional etiquette that rules for doctors and lawyers must be observed in the case of engineers, and that a consulting engineer must not advertise nor solicit clients. The worthy Council of the Institution of Electrical Engineers of London has promulgated a code of etiquette by which the conduct of its members is to be governed. This code of procedure requires that:

"No consulting engineer should solicit employment as consulting engineer verbally, by letter, by agent paid by commission or otherwise, or by any other means.

"No consulting engineer should answer advertisements for consulting engineers.

"No consulting engineer should advertise for employment.

"No consulting engineer should pay by commission or otherwise any one who introduces clients.

"No consulting engineer should receive trade or other discount, or surreptitious commissions or allowances in connection with any works which he superintends.

"A consulting engineer who is also directly or indirectly interested in any contracting or manufacturing business should inform his client in writing what his connection is with such contractor."

In the abstract this is to be partially commended and endorsed. It puts the profession upon a high plane and is dignified even if conservative. Whether it would be entirely satisfactory in this land of strenuous competition is, however, questionable. It might be well enough for an eminent engineer who has won distinction, and who has deserved reputation enabling him to choose from a mass of clients petitioning him for his services, but to the rank and file of the engineers of the country it seems somewhat rigid and hidebound.

Probably the English Council did not desire to be as rigid as on the surface would seem in its code, but desired to delicately draw a line beyond which zealous members of the profession might hesitate to go. It is not well to cast aside all professional dignity and put in low competition bids for work that demands a high degree of engineering skill, for as long as that is done, the standing of the engineer as a professional man will not rapidly advance in public estimation.

"I've made a success of everything else I ever undertook. Why shouldn't I make a success of this mine?" thinks the successful merchant or business man, and straightway proceeds to manage his mine purchase himself. Just pride in business achievements is commendable and a man has a right to feel confident and self-reliant because he has all his life grasped the right idea, and successfully solved difficult business propositions. But the business man embarking in mining may, upon reflection, or after a little experience, see that the assistance of some one who knows something of mining is a necessary factor in profitable mining. He wouldn't trust a miner to manage the business that he has built up; nor should he place in charge of a mine a man who, however clever in his own line, knows nothing of mining.

Concentrates.

GASOLINE ENGINES are in operation in Colorado at an altitude of 11,000 feet.

A 1 INCH Manila rope at a uniform speed of 80 feet per minute can transmit 15 H. P.

A 30,000-POUND GOLD DREDGER, daily capacity 1000 cubic yards, would require a 25 H. P. motor.

THE field notes as described in patent govern the metes and bounds of the patented property.

INDIA RUBBER and linseed oil are two substances for which no successful substitutes have been found.

A CASTING alloy of lead, 75 parts; antimony, 16.7 parts; bismuth, 8.3 parts, will expand when cooling.

CANDLE WICK dyed blue or green or some other distinctive color is one way of preventing theft of candles.

SO FAR as known the smelter company at Quartzville, Arizona, has no plant, and faith without works is dead.

THERE is no lode mine in Colorado below an altitude of 7500 feet; there are few in California above that altitude.

A **BRITISH COLUMBIA** mining claim is 1500x1500 feet, bounded by vertical side planes; no extralateral rights.

ONE pound avoirdupois as compared with troy weight is one pound, two ounces, eleven pennyweights, sixteen grains.

THE ninetenth and last dividend of the Eureka Con. M. Co. of Eureka, Nev., was paid Jan. 5, 1892, 25 cents per share.

THE average life of punched tin screens in a stamp battery is about twelve days; where the tin is burned off, fifteen days.

OF the silver production of the United States in 1900, 59.8% was from lead bullion, 21.8% from copper bullion, 27.4% from silver ores.

TO CURE rubber belt slipping boiled linseed oil and a little chalk sparingly sprinkled is effective. The belts should not be greased.

LEAD mined and smelted in Canada and refined abroad is now readmitted into Canada by payment of duty only upon the cost of refining.

THE highest London quotation for silver since 1850 was in 1864—62½d per ounce, British standard, 925 fine = \$1.40 per ounce, 1000 fine.

A CONDENSING engine will require from twenty to twenty-five gallons water to condense the steam evaporated from one gallon of water.

AMALGAM plates are sweated by continuous pouring of boiling water over them; but that is advisable only when permanent shut down is intended.

ONE AND ONE-HALF INCH lead pipe will weigh five pounds three ounces to the foot; 2½-inch lead pipe, ten pounds; 3-inch, eleven pounds ten ounces; 3½-inch, fifteen pounds.

CALIFORNIA produced 8,742,500 barrels oil in 1901 and consumed 6,000,000 barrels. The 1902 production will be about 12,000,000 barrels, and the consumption, approximately, 9,000,000 barrels.

THE hydraulic gradient of any stream is due to the volume of water discharged and the physical character of the country traversed, as to erosion, modified by its transverse cross-section and regimen.

FLOURING, or sickening of quicksilver, can be corrected by adding minute quantities of sodium and stirring. When the mercury is foul or greasy or dirty, it can, however, be best cleaned by retorting.

TO FIND the velocity in feet per minute necessary to discharge a given volume of water in a given time, multiply the number of cubic feet of water by 144, and divide the product by the area of pipe in inches.

A GRAIN = 0.0648 gram; an ounce, avoirdupois, = 28.3495 grams; an ounce, troy, = 31.103 grams. A gram is 15.432 grains. The assay ton contains 29.166 grams. There are 29.166 milligrams in one assay ton; 2000 pounds is to one assay ton as one ounce troy is to one milligram.

GLASS is a fine flux for cyanide slimes either in plumbago or clay-lined crucibles. One hundred pounds roasted (not acid treated) slimes, fifty pounds ground white glass, fifty pounds borax, make up the right proportion, and in a clay-lined pot treated in a quick furnace will give gold 860 fine.

CONCRETE mortar blocks are in increasing use by stamp mill builders, and where the cement is properly mixed and set that material has manifest merit. Iron mortar blocks are now being tried with some degree of success. In the use of iron mortar blocks they rest on broad concrete foundations.

CEMENT foundations have been used in California and elsewhere for the mortars of stamp batteries, and cement piles are in use in England. At Southampton, England, cement piles 45 feet long and 14 inches square have been driven by an ordinary pile driver striking a blow with a 6000-pound hammer, as foundation for a warehouse.

In an approximate way the value of a gold specimen in quartz can be estimated by a calculation based on the relative densities: divide the specific gravity of gold by that of quartz, and also by that of the specimen; from the greater quotient subtract the lesser; the remainder

is the proportion of gold; from the lesser subtract 1. The remainder is the proportion of quartz.

AN appeal can be made from any decision or ruling of any local land registrar or receiver to the Commissioner of the General Land Office within thirty days from its announcement. It may be either printed or written and must go through the local land office. A further appeal can be taken from the Commissioner of the General Land Office to the Secretary of the Interior.

THE theoretical miner without practical knowledge is in the same position as the practical miner without theoretical knowledge in so far as that they would be better off if they had both. Usually practical, experienced men make the best theorists, as they have something to start on, or from; they know when a theory is needed and what the purpose is that the theory is meant to fit.

THERE is no ton in troy weight; there is no such thing as a metal weight of twelve ounces to represent the pound troy. True, twelve troy ounces make a pound troy, but there is no such material, existing unit of measurement. A man with "five pounds of gold" has sixty ounces troy. But where gold is bought and sold as are other commodities he will look in vain for a "pound troy weight." It goes by ounces.

THE side lines of a mining claim become end lines when the claim is located crosswise of the vein, necessitating construction of the true side lines with reference to the ascertained course of the vein—parallel with and not to exceed more than 300 feet on each side of its center. In case the originally marked width is more than 300 feet the excess must be excluded, bringing the middle of the vein in the center of the location. Such discarded area is subject to other location.

A 5-STAMP mill, 900-pound stamps, 9-inch lift, ninety drops to the minute, would require 12.272 H. P. The formula is: Multiply weight of one stamp by number of stamps you propose using; multiply that by the height of lift in feet per minute, and that product by the number of lifts per minute; add one-third for friction; divide by 33,000, the quotient is required number horse power. Example: $900 \times 5 = 4500 \times \frac{1}{4} = 3375 \times 90 = 303,750 + \frac{1}{3}$ of 303,750 = 405,000 ÷ 33,000 = 12.272 H. P.

TO GIVE any estimate of the cost per ton of stoping ore must necessarily be approximate. So many conditions govern the cost of such work, and these conditions may be so different in different localities. It has been calculated in ordinarily favorable conditions, that where the ore streak was 4 inches thick the cost of stoping per ton was \$17.33; where 6 inches thick, \$11.55 per ton; 8 inches, \$8.67; 10 inches, \$6.93; 12 inches, \$5.78; 14 inches, \$4.95; but these figures are not claimed to be at all exact, merely indicating in a general way.

IF a bar for a tension test is reduced to a smaller cross-section by cutting out a curve surface for only a short distance as compared with its transverse dimensions, the bar will show a greater unit breaking stress, as the metal does not flow freely and lateral contraction of area is hindered. But, if the portion of reduced cross-section joins the rest of the bar by a shoulder, the apparent strength is reduced, owing to a concentration of stress on the particles at the corner, where the unit stress suddenly changes from the smaller value on the larger section to the greater unit stress on the smaller cross-section.

A CORD of wood weighing 4000 pounds, suitably treated, may be made to yield 2650 pounds pyroligneous acid and 700 pounds charcoal. The 2650 pounds pyroligneous acid is susceptible of production of nine gallons 82% crude wood alcohol, 200 pounds acetate of lime, twenty-five gallons of tar, and about thirty-five bushels charcoal. In the dense smoke per ton of soft coal burned are 10 to 12 pounds soot, 10% to 15% ash, and about 2% moisture. Where fuel is burned in an atmosphere of oxygen no smoke is produced. Where there are no hydrocarbons no fuel will produce smoke in any atmosphere.

THE Tamarack Mining Company at Calumet, Michigan, in connection with the preservation of its maps, has a photograph gallery with every appliance necessary for taking photographs 20 inches by 24 inches. At the end of each month the maps are brought up to date and photographs taken of them. This method gives maps of a size that may be easily handled or sent through the mails, and easier studied than larger mine-maps. A full set of such photographs also furnishes exact records of the condition of the mine. Any one who has had to write a mining report knows the difficulty of preparing a description, which of necessity must be more or less technical, so that it will be intelligible to the non-technical person for whom it is frequently intended. The best solution of the difficulty is through the use of illustrations. This can be done in two ways—by photographing, and by sketches. The former has the advantage of absolute truth, but the latter can bring out many important features that the camera fails to do, such as the structural character of the vein or of the country-rock.

UNDER ordinary conditions, iron melting in a cupola takes up sulphur from the fuel. The greater the percentage of fuel, and the greater the percentage of sulphur in the fuel, the greater will be the amount of sulphur absorbed by the molten iron. The ratio between the total amount of sulphur present in the fuel and the amount absorbed by the iron is dependent upon three conditions: First, the kind and quality of flux used; second, the temperature of the iron; and third, the com-

position of the coke and iron. A proper quantity of flux in a hot working cupola will take care of a considerable amount of sulphur. The sulphur present in the fuel as a sulphuretted hydro-carbon has no appreciable effect in increasing the percentage of sulphur in the melted iron. This accounts for the fact that many foundries melting with coal obtain castings with a lower percentage of sulphur in proportion to the amount of sulphur in the fuel than do foundries melting with coke. The greater the amount of manganese in the iron, the less sulphur will the iron absorb; and it is possible in cases of very high manganese iron for that iron to lose sulphur in melting, the sulphur passing off as manganese sulphide with the slag.

ELECTROLYSIS is the name given to the mechanical process which consists in the dissolution of chemical compound by the passage of an electric current through such compound. As applied to waterworks this takes place in the passage of the electric current from water pipe into the soil. The soil contains salts in solution. These salts vary in their character, but they nearly always contain sodium chloride from the street washings. There is a certain amount of refuse necessarily on the street at all times, necessitating the subsoll, being highly saturated with salts in solution, and the pipes are buried in the soil. These salts are decomposed by the passage of the current from the pipe into and through the soil, and the acid constituent of that process of decomposition attacks the iron, or the lead or the copper, as the case may be, of the pipe. The metal passes into solution, leaving in place of the metal, in the case of cast-iron pipe, a carbon in the form of graphite, which is not soluble in the ordinary acids or salts. This process is continuous, and does continue in proportion to the amount of current which leaves the pipe, until the pipe is so injured that the pressure of the water in the pipe causes it to burst.

IN the Silesian process for treatment of zinc ores there is required about twelve tons of coal to produce one ton of zinc, the labor costing at the rate of about \$15 per ton of zinc extracted. The Silesian furnace is simple in construction, being in the form of a flat arch, lined with firebrick, and bound together with iron rods. At each side of the furnace chamber are six or more alcoves or recesses, separated from one another by a slab of firebrick, but open on the side next the fire. In front of each recess is a door opening towards the outside of the furnace, and securely luted with fireclay when the furnace is in use. At the rear end of the furnace is an opening into the flue or chimney, while below the furnace are compartments corresponding to each recess above, in which the tubes from the retorts terminate. The earthenware retorts have long tubes or nozzles attached to the front of each, and bending down to the compartments below the furnace where dishes are placed to receive the zinc that is distilled from the ore. Either blende or calamine may be treated in these furnaces, and the danger of loss of zinc is slight. The ordinary charge for a twelve-retort furnace is about 700 pounds of calcined ore and 400 pounds of coal, to which is added 100 pounds of dross skimmed from the zinc obtained in previous meltings. The retorts are filled and the refuse extracted from the outside, and a furnace can be kept in uninterrupted operation for a year without repairs. Zinc ore containing silver and lead can be treated in the Silesian furnaces.

IN the process of extraction of gold from its ores by potassium cyanide, the gold is usually precipitated by means of zinc, but it sometimes occurs when zinc is used that the solution is too alkaline or too acid, resulting in the formation of zinc salts. The advantages of electrical preparation are that the preparation is as good in weak solution as in strong ores and however acid the solution may be the gold precipitates. The advantage of being able to use very weak solutions is great, as not only is there a less consumption of cyanide but a weak solution, say five parts in 10,000, can be used for treating cupriferous ores which would destroy stronger solutions. Zinc alone will not always precipitate gold from a very weak solution, and the advantage of electrical precipitation in some cases is manifest. The cathode upon which the gold deposits itself is made of lead sheets fastened in light wooden frames and connected with the negative pole of a dynamo. The anodes are made of iron. The current required is about .06 ampere per square foot. With cathodes 1½ foot apart a force of seven volts is sufficient. In the manufacture of aluminum from hauxite, an oxide of aluminum, the ore is heated in an electrical furnace. The furnace is made of firebrick, and originally the carbons were placed in firebrick lutes but the heat was found to be so great that they melted. The sides of the furnace were, in a later process, coated with carbon but the carbon became converted by the heat into graphite and conducted electricity so that the walls of the furnace were fused. Finally the difficulty was overcome by coating the carbon with lime which prevented the formation of graphite. The hauxite is placed in the furnace and carbon thrown over it. An iron plate is luted on over the furnace. The carbon poles are separated and an electric arc formed. The electro-motive force used is sixty volts, and the current 5000 amperes. Many devices have been introduced for condensing the fumes which arise from the smelting of lead. An electrical method has been recently proposed in which the fumes are led from the furnace through flues, and the fine particles of metal suspended in the fumes collected by means of a discharge of high potential electricity from metal points situated in the flue.

Steel vs. Timber in Mine Shafts.

The relative value of steel for lining shafts instead of timbering has been the subject of frequent notice and discussion, and while, as a general rule, the abundance of timber in most mining regions in the United States makes the subject one of secondary importance, yet the growing scarcity of timber in some few sections lends a little interest to the subject.

The latest practical paper on the relative use and value of steel or timber for shaft lining is by F. Drake, who, at a recent meeting of the Lake Superior Mining Institute, described the use of steel and its cost as compared with timber, citing as example B shaft of the Pioneer mine at Ely, Minn., 862 feet deep, lined with steel.

The article is condensed in the Engineering News.

The shaft dips at an angle of 70°, and contains two 6x6-foot hoisting compartments and one 5x6-foot ladder and pipe compartment. The sets consist of 30-pound T-rails for the hanging wall and foot wall plates; the end pieces and one of the dividing pieces are 25-pound rails, the dividing piece between the skip compartments being a 7½-pound I-beam. The various members of the set are connected with pieces of 3½-inch angle iron, 3½ inches long, riveted with two ½-inch rivets in each leg. The saddles or pieces extending longitudinally between adjoining sets are of 16-pound rail, each 4 feet long.

The lagging in the upper part of the shaft where rock is firm consists merely of lines of old wire rope stretched longitudinally about 5 inches apart, so as to prevent the falling of large pieces of rock. In the softer ground the ordinary 2-inch wooden planks were used for lagging. Since this use of wood materially lessens the safety of the shaft against fire, it is proposed to introduce four sections (4 feet long) of corrugated steel for lagging to every 100 feet of shaft.

The weight of the steel lining is supported at intervals of 60 feet by bearers, four 30-pound rails being used at each set so supported, the ends of these rails resting in cast iron chairs placed in the hitches cut in the solid rock.

The rails for the 5-ton skips are 30-pound rails, with 20 or 25-pound rails for the back runners to prevent jumping the track.

The important question of costs is answered in detail:

COST OF STEEL LINING FOR B SHAFT.

Material for Sets.		
2 18-ft. wall plates.....	360 lbs. @ \$0.0171	\$6.15
2 6-ft. end pieces.....	100 lbs. @ .0189	1.89
1 6-ft. dividing piece.....	50 lbs. @ .0189	.95
1 6-ft. dividing piece.....	45 lbs. @ .0224	1.00
8 4-ft. saddles.....	163 lbs. @ .198	3.22
8 connecting angles.....	26 lbs. @ .035	.91
4 4-ft. back rails.....	134 lbs. @ .189	2.53
6 brackets for back rails.....	45 lbs. @ .022	.99
Rivets.....	10 lbs. @ .038	.38

Cost of material per set.....	\$18.02
Cost of material per foot of shaft.....	4.50

Labor on Sets.		
11 hours laying out and drilling*.....	@ \$0.223	\$2.41
12.4 hours riveting sets and cutting slots in saddles, including handling.....	@ .211	2.60
0.6 hour transporting from shop to shaft.....	@ .213	.14

Cost of labor per set (933 pounds).....	\$5.15
Cost of labor per foot of shaft.....	1.29

*Includes all incidental handling of material.

Bearers and Chairs.		
4 11-ft. pieces.....	450 lbs. @ \$0.171	\$7.69
8 cast chairs.....	128 lbs. @ .04	5.12
8 cast chairs.....	288 lbs. @ .04	11.52

Cost of materials for set of bearers.....	\$24.33
Cost of labor, cutting and handling.....	.30
Cost of bearers and chairs per foot of shaft (bearers 60 feet c. to c.).....	.41

Hangers.		
30 pounds refined iron.....	@ \$0.026	\$0.78
1.67 hour labor forging a hanger.....	@ .211	.36
0.40 hour labor tapping and threading.....	@ .225	.09

Cost of one hanger.....	\$1.23
Cost of hangers per foot of shaft.....	.23

Lagging.		
Material for one set wood lath:		
468 ft., B.M., 2-inch plank.....	@ \$14.00	\$6.61
4 ft., B.M., 2x4-inch x 6 feet.....		
8% waste.....		.53
2 U-bolts.....	7 lbs. @ .05	.35

Cost for lagging.....	\$7.49
Labor cutting plank.....	1.00

Cost per set of wood lath.....	\$8.49
Cost per foot of shaft.....	2.12

Material for One Set Metal Lath.		
222 sq. ft. No. 16 galvanized corrugated steel.....	\$22.64	
5% waste and fitting.....	1.13	

Cost per set.....	\$23.17
Cost per foot of shaft.....	5.94

Since there were 16 feet of metal lath to every 84 feet of wood lath, the average cost per foot of shaft

for wood and metal lath was \$2.73. This, summed up, shows:

COST PER FOOT OF SHAFT LINING.
(Exclusive of skip rails, and exclusive of labor of putting lining in shaft)

Cost of steel sets.....	\$5.79
Cost of bearers and chairs.....	.41
Cost of hangers.....	.23
Cost of wooden lath.....	2.12

Cost per foot, with wood lath only.....	\$8.55
Add if steel, 16 feet to every 84 feet of wood lath used.....	.61

Cost per foot with wood and steel lath..... \$9.16

N. B.—Most of the sets were riveted with a pneumatic bammer, but a few were done by hand. The slotting of saddles was done by hand, but if some power appliance had been used this item could have been reduced 50 cents per set, or 12½ cents per foot of shaft.

In contrast and connection with the above is given the estimated cost of a wood lining for B shaft. This estimate is for sets of 10x10-inch timbers in sets 5 feet c. to c., and does not include the cost of labor in placing the lining in the shaft nor the cost of skip rails:

Materials of Set.		
2 wall plates, 10"x10"x20', 334 ft., B.M. @ \$16.50	\$5.51	
2 end pieces, 10"x10"x 8', 133 ft., B.M. @ 14.50	1.93	
2 dividing pieces, 6"x10"x 4', 60 ft., B.M. @ 14.00	.84	
2 saddles, 8"x 8"x 4', 168 ft., B.M. @ 14.00	2.35	
4 b'k runners, 6"x 8"x 5', 80 ft., B.M. @ 14.00	1.12	
20-ft. strap iron, ½x2½ ins.....	83½ lbs. @ .0235	1.96
Bolts.....	6½ lbs. @ .03	.19

Total for 775 ft., B.M. and iron in a set.....	\$13.90
Labor framing a set.....	1.60

Cost per set.....	\$15.50
Cost per foot of shaft.....	3.10

Bearers.		
4 pieces, 10"x14"x12', 560 ft., B.M. @ \$17.50	\$9.80	
Cost per ft. of shaft if bearers are 60 ft. apart.....	.17	

Hangers.		
15 lbs. ¾-in. round iron @ \$0.04.....	\$0.60	
Cost per foot of shaft.....	.11	

Lagging per Set.		
2-in. plank lath, 682 ft., B.M. @ \$14.....	\$9.54	
9% waste.....	.86	

Total.....	\$10.40
Labor cutting lath.....	1.36

Cost per set.....	\$11.76
Cost per foot of shaft.....	2.35
Total cost of materials and framing wooden lining per foot of shaft.....	5.73

The above shows that the cost of wood lining at the unit prices given is \$2.82 to \$3.43 less per foot of shaft than where steel lining is used. This is made up by the less excavation necessary where steel lining is used.

The author of the paper goes on to give the cost of sinking in two shafts sunk at the same time in the same formation. One shaft was, however, sunk by day labor; the other by contract. B shaft required about 23% less excavation than No. 2 shaft, this being due to the saving in space effected by use of steel.

	Shaft	
	No. 1—Pioneer Mine.	No. 2—Savoy Mine.
Dip.....	70°	83½°
Material of sets.....	Steel.	Wood.
Material of lagging.....	Part wire rope & part wood.	Wood.
Size of timbers of sets.....		10x12 ins.
Compartments.....	(2) 6x6 ft. & (1) 5x6 ft.	(2) 6x6 ft. & (1) 4½x6 ft.
Outside shaft dimensions.....	6½x18 ft.	7½x20 ft.
Outside area.....	117 sq. ft.	153 sq. ft.
Rock excavated per ft. of shaft.....	4½ cu. yds.	5½ cu. yds.
Progress per working day.....	1.43 ft.	1.54 ft.

Items of Cost per Foot.		
	B shaft. (Steel.)	No. 2 shaft. (Wood.)
1. Contract price of excavation.....	\$15.95	\$22.60
2. Company labor act of excavation.....	5.74	1.45
3. Labor account of lining.....	2.03	2.03
4. Shop and team labor.....	1.74	1.98
5. Explosives.....	1.86	5.26
Timber and laths for sets.....		.63
Mining timber.....	1.87	1.15
Iron and steel.....	1.52	1.10
Steel rail.....	4.70	.37
Wire rope for lining.....	.37	

Total, influenced by kind of lining.....	\$35.78	\$36.20
Other items not influenced by kind of lining:		

6. Miscellaneous labor regularly employed*.....	\$10.71	\$8.19
7. Pipe and fittings.....	1.17	.88
8. Miscellaneous supplies.....	4.68	2.81
9. Fuel.....	4.30	2.93
10. Air.....	2.89	1.33
11. Temporary surface buildings and head frame.....	.28	.58

Grand total.....	\$59.81	\$52.92
------------------	---------	---------

*Engineers, firemen, landers, etc.

N. B.—Fuel and air items were roughly estimated, and are subject to much uncertainty.

Mr. Drake's comparative figures favor steel, though some of the items and details would not fairly apply to exact comparative tests concerning the economy of the two. The paper is here given place as presenting the latest and in some ways the best data on the question of comparative costs. Of course, as to durability, the advantage in the Lake Superior region would be greatly in favor of the steel.

Gold and Silver as Compared With Other Mineral Products.

Some recent comparison was made between the value of the gold and silver products of the United States and value of other groups of our mineral products as set forth by the United States Geological Survey in "Mineral Resources of the United States" for the calendar year 1900. The annual volume for 1901, just issued, permits a similar comparison for last year.

In round numbers the value of the gold product was \$78,000,000, and of the silver product the value was \$71,000,000 as money (coining value) and \$33,000,000 as metal (commercial value). As metals, then, gold and silver products were valued at a little less than \$112,000,000; as money they were worth \$150,000,000. The corresponding figures for 1900 were \$115,000,000 and \$153,000,000—a loss for 1901 of over \$3,000,000.

The copper produced in 1901 was valued at \$87,000,000; the lead was valued, as in 1900, at \$23,000,000, and zinc was produced to the value of over \$11,000,000. The copper, lead and zinc products in 1901 were worth \$9,000,000 more as metals than our gold and silver were worth as metals, although the value of the copper product was \$11,000,000 less than in 1900.

The combined values of abrasive materials, of chemical materials, of pigments, and of other miscellaneous minerals, amounting to about \$38,000,000 in 1901, show that they were worth almost half as much as the gold produced, and about \$5,000,000 more than silver as a metal.

The structural materials produced in 1901, the building stone, the clay products, the cements, valued at about \$182,000,000, exceeded the gold and silver by \$70,000,000, if the commercial or metal value of silver is taken, and by \$32,000,000 if silver is taken at its coining value.

Iron ore and its products, the metallic basis of our civilization, increased notably in quantity, but decreased in still greater proportions in value in 1901 as compared with 1900. Yet, notwithstanding a loss of nearly \$18,000,000 in value as compared with 1900, the pig iron produced in 1901 exceeded the metal value of the gold and silver by \$130,000,000, and their combined coining value by \$95,000,000.

Compared with the mineral fuels—coal, petroleum and natural gas—produced in 1901, the combined coining value of the gold and silver is exceeded by \$292,000,000, and the combined metallic value is as \$112,000,000 to \$442,000,000, an excess of \$330,000,000 of the necessary fuels over the precious metals.

The Setting of a Boiler.

The setting of a steam boiler is a most important operation and should always be given the most careful attention, and due consideration should also be given to the possibilities of the future. Particularly is this true about mines, where the excavation of large areas beneath the surface causes an unequal subsidence of the ground, resulting in a change of position of all the buildings and machinery which have been placed on the area of disturbance.

The fact that a boiler has been set in a certain position in a more or less poorly lighted and inconvenient corner is often taken as a final solution of the steam problem, being given but little further attention than to keep fuel under it in sufficient quantities to get the required pressure. To think that it is possible for the boiler to change its position does not seem to occur to those in charge. It would probably be vigorously disputed that such a thing could happen, but the recent explosion of a well-kept and carefully-fired boiler in Detroit is a striking example of the fact that boilers do change their bearings, if not their position.

It is a common practice to set boilers on brick-work, as was done in the case noted, the boiler in this case having three lugs to sustain the weight. It is given as the opinion of the inspector who saw the wreck, that one of the forward bearings had settled, allowing the greater part of the weight to settle on the middle lug, with the result of rupturing the plate by the excessive strain.

As a matter of fact, it is always a bad plan to place stationary machinery on the side of a vein where the subsidence due to underground work is likely to occur.

SOMETHING new in rock drilling for deep holes is reported from Frankfort, Germany, where Howarth and Walski have a device for utilizing the flushing water instead of the boring rod to convey motive power to the borer, the boring being done by a hydraulic motor attached to the bottom of the rods, water under pressure being forced through the hollow rod to the motor, the escaping water doing the flushing. The engineers mentioned say that with a drive pipe and piston 2 inches in diameter and a working pressure of 170 pounds, the test motor gave twelve strokes per second, consuming 1.1 gallon of water, and that the 8-inch bit drilled through hard sandstone at the rate of 26 inches per hour; in soft sandstone at the rate of 23 feet per hour.

Low-Grade Gravel Property.

Written for the MINING AND SCIENTIFIC PRESS.

Under the title, "Hydraulic Mining in Low-Grade Gravels," the MINING AND SCIENTIFIC PRESS of Nov. 16, 1901, published an interesting study of results obtained by working such deposits. Guided by that

even in favorable seasons, never yielded over 450,000 miners' inches. More recently, however, by advantageous reconstruction, this has been increased until from 650,000 to 750,000 inches are obtained, according to the winter. This big supply of water—a daily average of 3000 inches during eight months—can not be utilized constantly with profit in only one spot. For good work it is necessary to have several points

tion to be worked with profit. In fact, twice during the season the water was turned out of this mine altogether, preferring to suspend there than to work it improperly. Later results have justified this course by amply counterbalancing the losses due to suspension. What I shall say in regard to expenses may be taken as applying to both mines, though the results in the second are not so satisfactory as in the first; yet to obtain an impartial average I have included both in the tables that follow.

The geology of these placer deposits furnish material for an interesting study. In my opinion, the formations may be divided as belonging to two distinct periods—the first marked by the existence of a lake and the second by the filling up of the lake. Both of these consist of gold-bearing gravels, with material of every size from pebbles to boulders of 2 and 3 cubic yards in volume, and requiring water, powder and the derrick for their removal. To handle these latter the mine is well equipped. The bank is broken by four giants: one on the front with a head of 400 feet and nozzle 7 to 9 inches, according to circumstances; two on the left side with 150-foot to 250-foot heads; and one on the right with 500-foot head, to break the cement.

My plan of working is the result of long and careful observations and may be condensed to the following statement: "Run heavy and keep the sluice clean." Although this is not very easy, I have succeeded with it and ascertained to my own satisfaction that it gives good results. The deposit fills a gulch whose sides are inclined at an angle of about 30°. On the left the bedrock is a hard, even diorite, and on the right the blue clay rests on a decomposed, pulverized granite. The gravels vary in thickness from 2 feet to 250 feet, bearing gold throughout.

Broken by the side giants, the bank is prevented from sliding too far by the front giant. (I have seen the bank slide ahead as much as 100 feet in twenty-four hours.)

The bank being for the most part loose, this sliding is of course induced by the piping. For this reason the entrance of the sluice is kept at a safe distance—usually about 150 feet away—and the front giant always settled at the head of the sluice.

The sluice is 6 feet wide by 4½ feet deep, with the boxes 12 feet long. At the beginning of the last mining season I had down fifty-six boxes, and at the end of the run 118, of which additional number fourteen were at the head and forty-eight at the lower end. The grade is 8 inches to the box (12 feet). The bottom is laid with blocks in the first ten boxes and boulders in the others. Two undercurrents collect the fine gold very satisfactorily.

I termed it "low-grade" gravel because numerous panning tests during the season showed an average of from 4 to 6 cents per cubic yard. (These tests do not include the prospects which induced the company to buy the property.) Despite this small percentage, I have been able to reach some satisfactory results. To show this in figures, the following table is prepared, and, for the sake of comparison, the results of several years are embodied there; also, the last season, being the only one coming under the present management. I have referred the total amount of expenses and returns to the miners' inch:

COST AND RETURNS PER MINERS' INCH.								
	1895.	1896.	1897.	1898.	1899.	1900 9 Mo.	1900- 1901.	1901- 1902.
Cost	\$0.136	.106	.095	.1004	.866	.0081	0.0855	.08219
Returns.	0.136	.125	.136	.103	.100	.0738	0.0663	.1418
Cost per \$1 Ex'd.	1.000	.850	.705	.972	.862	.924	1.289	.5822

The volume of gravel washed out is not very easy to get at, because for over half a mile in length the outside lines of the bank are changing continually. Without entering into any hair-splitting mathematics, however, I have estimated that between 2½ and 3 cubic yards are moved per miners' inch of water used. By an approximate triangulation of the area worked over in former years, I find that during last winter about two and a half times as much gravel was moved as in any previous season. No changes in the character of the bedrock have been encountered.

In order to obtain these results, I have practiced the following:

- 1. Increase of pressure on the giants.
- 2. Heavy run in the sluices.
- 3. Increase of responsibilities and, consequently, of some salaries.
- 4. Decreasing number of laborers by using more water power.
- 5. Three times a week a careful inspection of flumes, pipe lines, sluices, derricks, etc.

The distribution of the gold, as caught in the sluice boxes, is as follows:

	Boxes.	Per Cent.
First section	15	73.5
Second section	30	13.4
Third and fourth sections	71	1.6
Undercurrent		11.5

From this it is evident that a long sluice is unnecessary, the coarse gold always stopping in the first

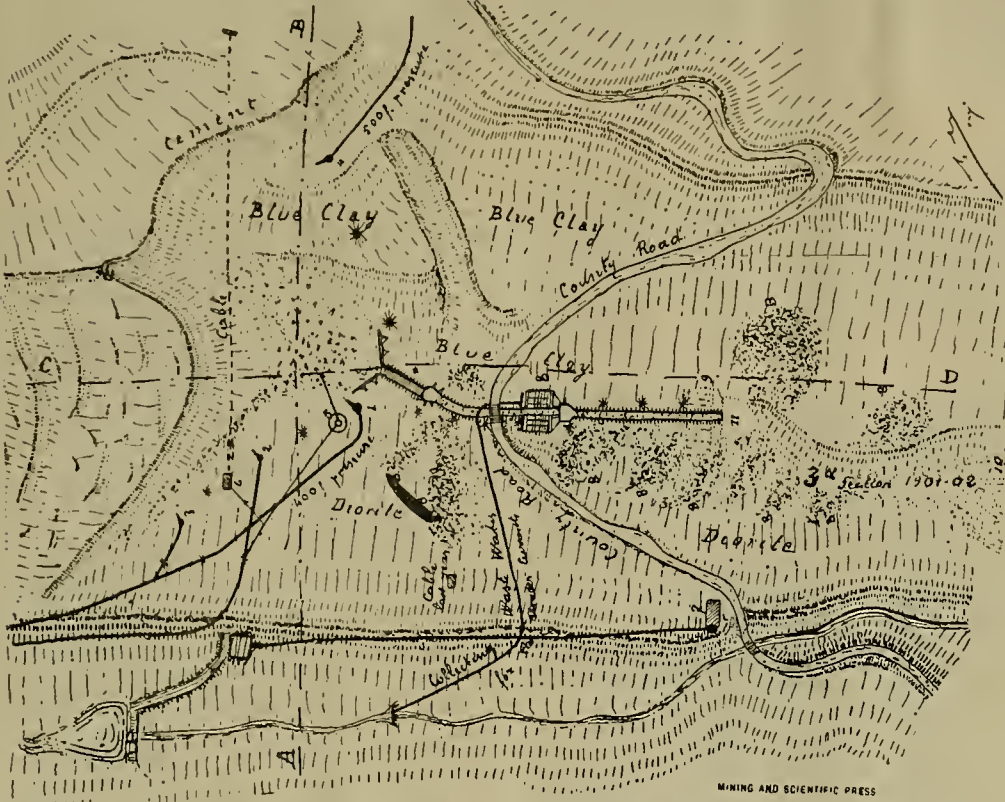


Fig. 1—Ground Plan of California Hydraulic Mine.

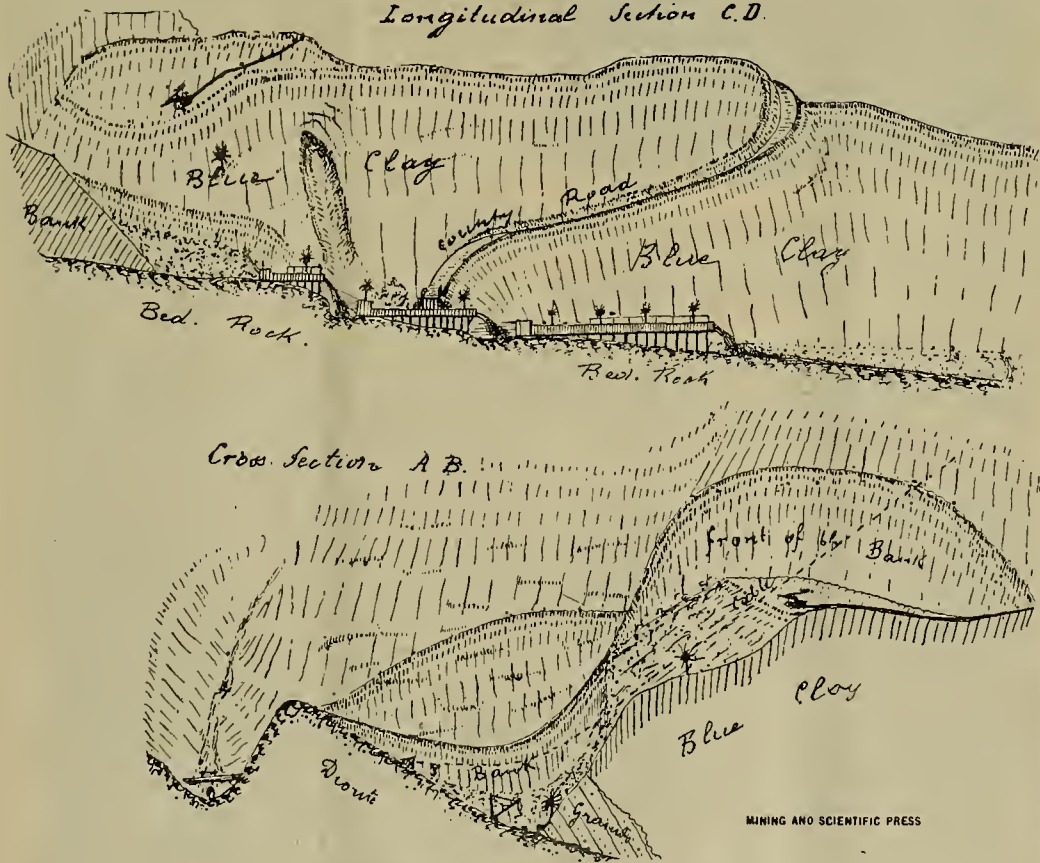


Fig. 2—Section of California Hydraulic Gravel Mine.

article, I present the following experiences for further consideration and for the encouragement of the owners of such placers.

The property to be described is in California, and some considerable capital has been expended there for the bringing in of water, as well as on the purchase price of the ground itself. The water is conducted to the mine by flume and ditch a total distance of 30 miles, having a capacity of 3000 miners' inches. The nature of the ground through which the ditch is cut, the steep slope of the hillsides and the severity of the winters cause the expense of maintenance to be rather high, aggregating about 22% of the total exploitation expenses. During the earlier years of the company's existence their water right,

of attack, thus allowing changes of water, moving of machines, clean up and other contingencies to be overcome without complete suspension of operations. The water supplied last season was used in the following way:

First mine.....	82%
Second mine.....	13%
Electric lights, derrick, irrigation	5%

This unequal distribution between the two mines is one of intention, and due to the nature of the bank to be washed. The first is of loose gravel with slides and cracks for over one-half mile. Here our efforts have been concentrated, as the other place is characterized by a hard cement, requiring a special installa-

boxes and the fines being caught in the under-current.

To show the exact proportion of all expenses during the running year, the following table has been prepared:

CLASSIFICATION OF EXPENSES PER MINERS' INCH.

Piping and sluicing.....	\$0.01224	15%
Lengthening sluice.....	0.00073	
Moving machinery.....	0.00045	
Moving derricks.....	0.00071	
Moving boulders.....	0.01285	16%
Cleaning up.....	0.00065	
Electric lights.....	0.00134	
Blacksmithing.....	0.00136	
Carpentering.....	0.00187	
General repairs.....	0.00507	
Lumber and powder.....	0.00668	
General supplies.....	0.00422	
Ditch, maintenance.....	0.01534	22%
“ supplies.....	0.00247	
Reservoir.....	0.00110	
Stable and teams.....	0.00110	
Taxes.....	0.00422	
General expenses.....	0.00979	12%
Total.....	\$0.08219	

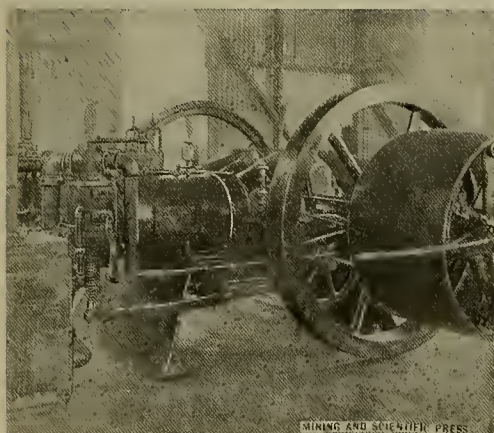
From this it is observed that 50% of the total expenses is made up of the following: Ditch, 22%; sluicing and piping, 15%; general repairs, 12%.

The author of the article published Nov. 16, 1901, said the results were not very satisfactory to the stockholders—who, by the way, are usually hard to satisfy. My experience shows that low-grade placers can be worked with some profit; but it requires very close attention to the details, for the wasting of the smallest fraction of a cent per miners' inch of water used may imperil the future welfare of the mine.

The accompanying maps or diagrams of the ground discussed may aid in the above.

Cheap Power for Mining.

Herewith is illustrated a 75 H. P. crude oil gas engine furnished the Vandalia mine, El Dorado county, Cal., by the Daniel Best Manufacturing Co., San



Double Cylinder 75 H. P. Crude Oil Engine; Size of Cylinder, 13x18 Inch Stroke; Compressed Air Self-Starter; Oil Consumption, 1-8 Gal. per H. P. per Hour, Working up to Capacity.

Leandro, Cal. The engraving shows the position of the crude oil gas generators where attached to the engine—the two square receptacles in the front of engines as shown—as well as the friction clutch pulley and levers on one engine, and which are the same on the other engine, in so far as the levers are concerned. The engine has two cylinders 13 inches diameter and 18 inches stroke, crankshaft 4½ inches diameter, both cranks set same way and counterbalanced; has two flywheels and gives impulse every revolution; has an attachment for self-starting operated by compressed air. The ignition is produced when first starting up with a battery, and when under way the battery is switched off and a sparking dynamo afterwards furnishes the ignition for the explosive mixture, which is also furnished with the engine. It requires one-eighth of a gallon of Coalinga crude oil to produce 1 H. P. per hour. Weight of engine complete is estimated at ten tons. Floor space required is 10x11 feet.

This engine is essentially the same in construction as all of the crude oil gas engines supplied by the Best Manufacturing Co., except that it is of greater power than others they have had previously, and indicates to them that it is practical to operate any size engine desired on crude oil. They are of the opinion that the larger sizes give better results than the smaller sizes and use less gas (to a certain limit) per horse power produced.

Speaking of the engine herewith shown, W. C. Ralston, at a recent meeting of the executive committee of the California Miners' Association, said: "I recently visited the Vandalia mine, El Dorado county. I found that with a 75 H. P. engine they were using Coalinga oil, distilling the oil and using the gas to run a gas engine, and their cost for the last five months has been from 17 cents to 20 cents an hour for 75 H. P. That is \$1.80 a month per

horse power. Free water power can not heat that. I thought our power at the Melones mine, Calaveras county, Cal., was pretty cheap. We have the Stanislaus river and it costs us nothing but the maintenance of the flume; but, taking the cost of the dam, the cost of the flume, the cost of maintenance and charge off to depreciation, and we can not provide power for \$1.80 per month. And there is a plant there that was a revelation to me in regard to cyaniding the raw ore. They have 470-ton tanks and in forty-eight hours they are extracting 85% to 90%. They are getting the cost down there to nearly \$1 per ton."

The Thermo Hyperphoric Process.*

By A. T. FIRTH.

The following is an account of the thermo hyperphoric process, for the treatment of heavy complex sulphide ores containing large quantities of galena and zinc blende, iron and copper sulphides, and more or less gold, antimony and manganese oxide with traces of tellurium and free sulphur.

This ore can neither be treated by cyanide, chlorination nor by direct concentration after an oxidizing roast. In the latter method only 22.7% of the gold was saved. The above ore, which was from the Tui mine, near Aroha, N. Z., was dealt with by the thermo hyperphoric process with highly satisfactory results during 1900. The process is as follows:

The ore was first passed through a rock-breaker and elevated to the top of the roasting and reducing furnace, which was entirely heated by crude coal gas. The dimensions of the furnace were 25 feet long by 12x12 feet, containing four rows of four muffles, each 13 feet long, the ore first entering through the top of each of the first row of muffles, when it was raked back until the floors were covered evenly to a depth of about 4 inches.

The reducing gas (water gas), which consists of a mixture of carbonic oxide and hydrogen, was then introduced through the back of each muffle, and passed over and through the red-hot ore. After one hour's treatment in the first muffle, it was raked back, and fell through an opening into the next muffle beneath, and again evenly spread, undergoing a similar process as in the first. This was continued down to the fourth muffle, the ore remaining one hour in each, or in all undergoing four hours reducing roast. It was then raked out and fed into the mill while red-hot and wet crushed, the sudden chilling of the ore increasing the reducing efficiency of the mill.

The ore was crushed to forty-mesh and passed over Frue vanners, the resulting concentrates representing 20% of the total weight of the ore, and contained 1.85 ounce gold and 17.24 ounces silver per ton and about 54% of lead, the remainder being made up of iron, silica and copper, with traces of zinc and antimony.

The ore before treatment averaged .425 ounce gold per ton, thus showing a saving of 87.06% of the gold value. The concentrates were then fluxed and smelted, and the resulting lead bullion bought by the Australian Smelting Co. and the various metals extracted and refined.

On account of decreasing value of the ore, this plant was closed down in the latter end of 1900. The total cost of treatment of ore did not exceed \$4.60.

*Journal Chemical and Metallurgical Society of South Africa.

WHEN cleaning out a steam boiler, lighting the interior is important. Open lamps in a boiler are a danger, in consequence of the little room to move about and the risk of setting clothes on fire. Easily inflammable lamps, such as kerosene or gasoline, are liable to explode, and the explosion of a lamp in a boiler is more serious than elsewhere, for it is harder to get away from it. The common oil lamp, by its production of smoke, soon makes the interior of a boiler unendurable. An electric lamp has been designed for the interior of a boiler which can be adapted wherever an electric lighting system is in use. An ordinary incandescent bulb is attached to an insulated, flexible conductor of sufficient length to use it in any part of the boiler. The conductor is attached to the lighting system in the usual way. As there is nothing on the inside of a boiler to hang a lamp on, the bulb is fixed on an electromagnet, so that it can be stuck upon any part of the ironwork. The incandescent bulb is covered with wire work to prevent it being broken.

A 16 AND 12x18 COMPRESSOR, if in good condition, should be capable of operating three 2½-inch drills or two 3½-inch drills with eighty pounds air pressure. A 6 and 6x6 air compressor is not large enough to run any drill, as the capacity would be only about 25 cubic feet of free air per minute. This calculation is based on the three 2½-inch drills using 260 cubic feet of free air per minute, or two 3½-inch drills using 252 cubic feet of free air per minute. To calculate the free air capacity of the compressor, multiply the effective area of the air piston in square feet by the piston speed in feet per minute, which in this case is about 270, based on a speed of 120 revolutions per minute.

An Economical Mining Method Required.

TO THE EDITOR:—I have made especial note that on every opportune occasion you emphasize the benefits to be derived from a mutual intercourse concerning any innovation of method or successful system as introduced in progressive mining.

I have recently become identified with a proposition wherein none of the systems of which I have had a practical experience, nor any of the special methods as described by interesting contributors in the various mining journals from time to time, will apply, and if any party can offer a good solution for the cheapest route from stope to rock breaker, I am sure such information will be valuable to others who, in company with myself, are striving to "round corners and polish ragged edges."

The property in question is a low-grade silver-lead mine, with a mill capacity of 200 tons daily. The values are found in the walls to a large extent, the veins proper being generally simply talc streaks. The pay rock will vary from 4 to 25 feet in width, the average being 8 feet. The waste and ore is so intermingled that the breaking of each individually is impossible. The whole thing has to come together. The ground is blocky, and the mere act of breaking it is the least source of worry, that is, providing it does not come too readily—a contingency to be watched. Timber is out of the question; that item alone would be an important one as bearing upon the matter of dividends or debit. Hoisting the waste must be dismissed with the same treatment as the timber question; therefore the question resolves itself into the storing of the broken stuff in the stopes. Now for the waste. Giving it to the mill to sort is impossible, and headroom for any elaborate system of surface sorting is not available without great expense, not to figure on a hoist with a capacity crowded so as to keep it busy on ore proper. Conditions being such, it seems to force the solution back into the mine and to center on devising a method for equal storage in the stopes. But how? I know of a dozen ways wherein it can be done after a fashion, but they all entail a certain amount of "fiddling," and the terms "fiddling" and "economical production" are antagonistic. Cheap mining, stripped of its bulk of contributory conditions, means the breaking of ground at a low cost and the utilizing of gravity at every possible turn. "Don't wear your rock out in handling," is an axiom I digested many, many moons ago. Possibly, some unkind reader will be tempted to remark that the information I am looking for savors of a desire to lift one's self by the bootstraps. But is it? There is one thing that can not be avoided, viz., the sorting of the blocky waste in the mine, which is in a proportion of about one-third, and it is the sorting and storing of this matter cheaply that is the troublesome feature. It can be kept separate by the rearing of cribbing across the stopes at intervals of, say, 30 feet, alternating storages of ore with cribbed cross-sections of waste. This would solve the separate storage question, but it would be the resorting to methods precluding any slashing operations. The rearing of a longitudinal wall of waste on the foot wall has also been considered; but its defects would be many, as it would be a doubtful question whether such a false foot wall would remain intact when surplus ore is drawn away, while the utilizing of a solid cribbed face would be breaking into the tahoeed sphere of expense.

In conclusion, I would say that by entirely replacing present top gear, and by the installing of an elaborate system for sorting, thereby incurring a heavy expenditure, the installation of a more expeditious means of hoisting, and a general transformation in means of operation, a plan could be devised that would prove a true solution, but it is not a scheme that will call for an enormous expense, nor a plan for the courting of an incursion into the directors' hank accounts that I am looking for, but a bright idea for the economical partition underground—something that will allow the cutting of things wide open—a plan whereby present conditions will contain the elements for its practical operation. Perhaps this is a big order, but I cannot get myself to believe that it cannot be done.

Denver, Colo., Nov. 14.

The writer of the above communication is evidently somewhat perplexed, but there may be those who can offer a suggestion to him which may prove of great value, and any solution of this vexing problem that may be offered will be published, for it is only through this exchange of ideas that we get the broadest knowledge. It is here suggested that possibly the desired object may be accomplished by heavily timbering a main gangway along the ore body, lagging the top and sides with poles, chutes being provided at proper distances, usually 30 feet apart, and mill holes (single) being carried up as the work of stoping upward progresses. The waste may then be packed about the timbers, which extend only one set high, and about the cribbing of the mill holes, the ore being sorted out as blasted and thrown down the mill hole. If there is not sufficient

waste made of this system the deficiency may be supplied from the walls, or either of them. In this system it will be necessary to guard against falls of rock from the roof of the stope in large masses. As it is stated that the zone of mineralization varies greatly, it is further suggested that the narrow portions, unless much richer than the wide ones, be left to form arches or pillars to give support to the workings. It may also be found necessary to put in an occasional stull, which may be recovered when the filling has reached it.—Ed.

The Cornish Stamp Mill.

Written for the MINING AND SCIENTIFIC PRESS by C. M. MYRICK.

To one interested in the development of mining appliances no country offers a more interesting field than County Cornwall, England. The latest methods are being introduced, but side by side with them the old ways still prevail. This clinging to old ways is due in part to labor conditions, and partly to a reluctance to scrap old machinery. For many years the hulk of Cornish mining has been confined to the working of tin ore. The tin occurs in lodes, disseminated in a quartzose gangue as cassiterite, an oxide of tin containing 78% metal. To free this oxide the ore is crushed and concentrated, and the nearly clean oxide reduced to metallic tin in reverberatory furnaces. Gravity stamps are used for crushing the ore; and notwithstanding that the old Cornish stamp mills are crude, heavy and noisy, they still handle the hulk of the product. On a very hard and tough ore their capacity per stamp is something over half a ton of ore per twenty-four hours. The stamp proper weighs about 600 pounds and is made up of a mass of iron cast on the end of a wrought iron stem, or "lifter," which is 2x3 inches in size and about 12 feet long, somewhat enlarged where it enters the casting. The cast heads are of rectangular shape, 6x12 inches in section and 2 feet high. They stand in the mortar with flat faces towards one another and very close together. When the head wears away the stamp is sent to the foundry to have a new one cast on. The stamps do not revolve. For a tappet, or "tongue," a massive iron ring is slipped over the stem and held in place by a heavy iron wedge. The cam shaft, or "axle," is a hollow cylindrical casting, 2 feet in diameter, with the shell $2\frac{1}{2}$ inches thick. It is provided with openings, symmetrically spaced, into which steel or wrought iron pieces are inserted and held tight by iron wedges. As the "axle" revolves these projections engage the tappets and thus act as cams. Their positions are such as to lift the stamps in proper rotation. One turn of the cam shaft raises each stamp five times, so that with a speed of fifteen revolutions the stamps drop seventy-five times a minute.

The contrivance is very suggestive of an old style music box on a gigantic scale with its cylinder of

there are extensions 8 or 10 inches in diameter, to serve as journals. Each cam shaft is long enough to take in three or four batteries of four stamps each, and is carried on heavy wooden trestles that are independent of the battery frames.

The mortars, or "coffers," are of wood lined with iron, and each holds four heads of stamps. No dies are used, the stamps simply dropping on a thick bed of ore that always fills the bottom of the "coffer." Instead of ore feeders, each mortar is provided with a broad ore chute extending its whole length. A bin keeps this chute supplied with ore which keeps sliding into the mortar as the stamps beat out the bottom. On account of this feeding arrangement the back or heel of the boss wears away faster than the front, leaving a sloping surface. If this becomes too pronounced, the stamp is turned half way around. In places where the water from the mines is used it was found that iron screens were rapidly corroded. This difficulty was overcome by using punched copper sheets. They are round needle punched, about equal to 20-mesh, depending on the character of the ore. The screens, or "gratings," are made from sheets something less than one-thirty-second of an inch in thickness, and they last from two to three months. When worn out they are returned to the maker for their value as copper. Their first cost

ever, is always under cover. The cut shows a style of engine house that is very typical in Cornwall. It is a massive granite building, with a chimney of invariable shape built into one corner, and with walls heavy enough to serve as a fulcrum for the overhead walking-beam, one end of which extends outdoors. The engine is nearly always a single cylinder, set vertically, with piston rod extending upwards to connect with a walking-beam, and a valve system similar to that seen on the San Francisco ferryboats. It is slow running, and everything about it is massive and long-lived. The photo is of one used for hoisting from a depth of 2600 feet and has the reel keyed to the crankshaft. It would seem an awkward thing to handle, but the engineers soon learn to avoid dead centers. The same general type is used to operate the pumps and run the stamp mills. They are always used with jet condensers and although many of them have been running for two or three generations, they are very economical of fuel. When a mine is worked out and abandoned, everything gradually disappears; but these solidly built engine houses remain as monuments. To day they are a very distinctive feature of the landscape, and their numbers are eloquent of the past activity of the Cornish mining industry.

Danger in Thawing Giant Powder.

The season of the year has arrived when a word of caution to miners everywhere in regions where the temperature goes lower than 45° Fahr. is not out of place, as at that temperature and lower nitro powders freeze and for the time being are useless as a blasting agent, and relatively harmless. Powder in this condition must be raised to a higher temperature by application of heat, but this must be applied very gently or an explosion is likely to result. Nitro powder should never be thawed over an open fire or on the top of a steam boiler. Nor should it be held in the hands and rubbed or squeezed. The oven of the cook stove, or the floor beneath any sort of stove, is equally an unsafe place to put frozen powder for the purpose of restoring it to a proper temperature. It is a strange but interesting fact that while these simple words of caution seem foolishly unnecessary, yet each winter sees just the things done that are enumerated above, with disastrous result, and other expedients even more hazardous are resorted to. It is not because miners generally are ignorant of the likelihood of premature explosion, but long immunity from accident of this kind makes them careless. The safest way to thaw frozen powder is in a covered can immersed in water, the temperature of which, at first low, is gradually raised to 70° or 80°. This may be accomplished in a variety of ways, as has been previously explained in this paper. One safe and inexpensive method is to provide an ordinary oil barrel with two pipes, one inserted in the side of the barrel near its top and the other near the bottom. These pipes should project outward several feet and be connected with each other by a third piece arranged vertically. A fire may then be built under the lower pipe at a distance of 4 or 5 feet from the barrel, which is filled with water to a depth sufficient to cover the upper pipe. The frozen powder in a suitable can is then placed in the water and secured so it can neither sink nor overturn. The can should then be covered, and the heat of the fire will gradually raise the temperature of the water in the barrel and with it the temperature of the powder. This is accomplished so slowly that there is then no more danger in handling the powder than during a day in the spring time.

Since writing the above precaution, the following has come from Ruby, Colo. The method pursued in this instance was both novel and ingenious. It will be noticed that it does not occur in the list of methods above referred to:

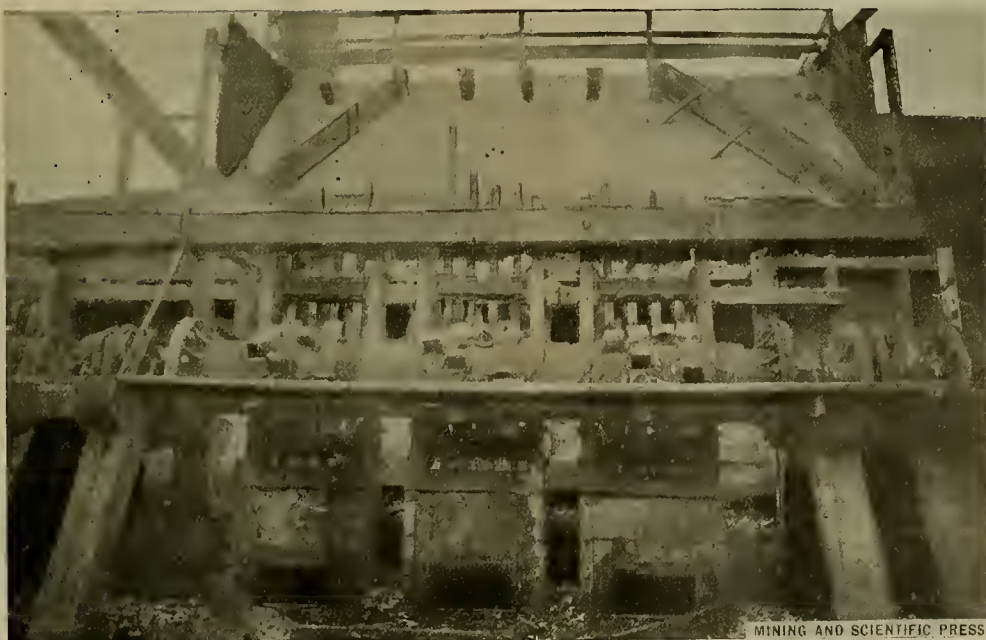
Pete Young and Oscar Mack were the victims of an explosion at Ruby last week. The accident was due to careless handling of the giant powder used in blasting. To thaw the powder they cut one end out of an empty powder can, made holes with a pick point in the other end, placed a pit lamp under the can, and three sticks of powder on top of the can. In about fifteen minutes the powder exploded, injuring both men quite seriously. Mr. Mack will recover, unless blood poisoning occurs. Mr. Young's injuries are of a more serious nature, but even he has a chance for recovery.

URALITE is the latest fire-resisting material to claim the attention of engineers, its name being due to the fact that its inventor, an officer of the Russian army, was stationed near the Ural mountains, and that a part of its substance, the asbestos, comes from that quarter of the world. The asbestos is ground to pulp and mixed with about 30% of chalk, to fill up the interstices between the short fibers, and, after passing through various chemical processes, appears in the form of tough, pliable strips. Gelatinous silica is used as a cementing substance, about 20% being used, thus leaving the proportion of asbestos about one-half of the total. The boards made from this substance are claimed to be tough and to stand a large amount of wear and tear, but their chief interest arises from the fact that they appear to be utterly impervious to fire. According to what particulars



Hoisting Engine at "Old Dump Shaft," Dolcoath, Cornwall, Eng.

Cornwall is dotted all over with such structures, all built in exactly the same way. A vertical cylinder is inside and is connected to the outside reel by beam and wooden connecting-rod. This engine is drawing from a depth of over 2600 feet. Two are at work in Dolcoath, also three modern hoisting plants



A Cornish Stamp Battery, Camborne, Cornwall, England.

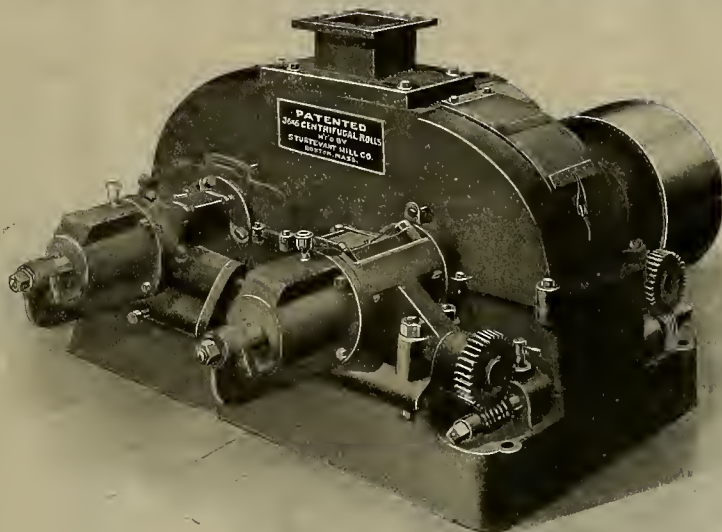
many projecting pins. Considering that the stamps work in individual cast iron guides, which are generally loose and rattling, it may be imagined that the music from a 200-stamp mill is somewhat titanic. It has the intensity of that from truck loads of iron rails being hauled along a cobbled street, and a peculiar rhythm due to the slowing of the engine as it turns the centers. Heavy cast heads are bolted to the ends of the "axles," and from these heads

seems high but they are really very economical. The engine is located midway in a line of batteries, and the power is sent along through the cam shafts, which engage one another by means of a massive crank arrangement, bolted to their ends. The sweep of the engine is directly connected with this cam shaft line. This, of course, does away with the use of all line shafts and belts, and makes it possible to operate the mills without housing. The engine, how-

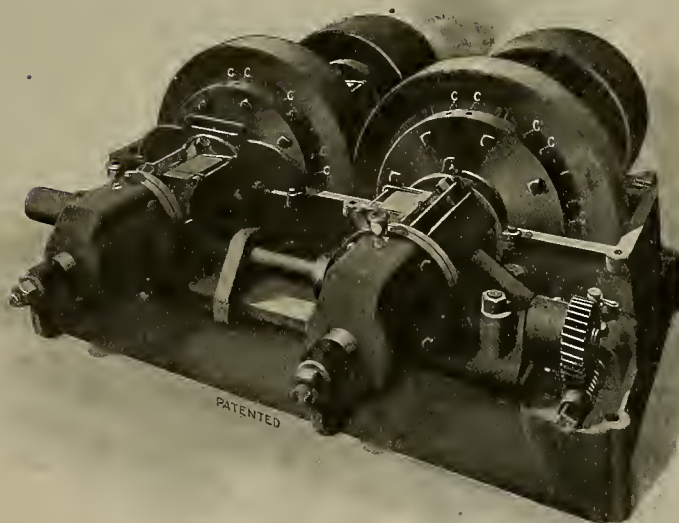
are available, they may be planed or sawed like ordinary wood, and glued or nailed with equal facility. Numerous experiments have been made with the material, all intended to demonstrate its superior qualities as a fire resistant, and all appear to have been successful. Doors made of it have withstood extreme temperatures without injury. A deed box was subjected to a very hot fire for an hour and a half. When opened it was found that the papers were not even charred. As a material for constructing file boxes, and in various other ways where papers are to be preserved, it would thus seem to have a large field of usefulness. Its application on shipboard may be another important field.—Cassier's Magazine.

Sturtevant Centrifugal Crushing Rolls.

The 36-inch centrifugal rolls here illustrated are the largest made by the Sturtevant Mill Co. The tires are $4\frac{1}{2}$ inches thick, are of high carbon steel, and have sixteen tons pressure at ordinary speeds. They can be run as fast, or as slow, as required, and attain greatly increased pressures when fast running



Sturtevant Centrifugal Crushing Rolls.



Sturtevant Centrifugal Crushing Rolls.

brings in the rapidly augmenting centrifugal forces. The hearings are dust proof, and the side adjustments simple and durable; tires may be removed in a few minutes, it being only necessary to turn in set screws in the head peripherys, these press back the tire spring weights; then the tire is released and may be slipped off easily. When tires are replaced the set screws are taken out and the tires at once secure themselves.

The manufacturers argue briefly the question of large and small roll constructions, saying: "Since rolls crush by the pressures of their revolving tire surfaces it is plain that if the tire widths and pressures are the same the output of all rolls will be in exact proportion to tire velocities, regardless of diameters. A small roll, therefore, may do as much as a large one, if the tires can attain the same speed."

"The tire surfaces of the smallest centrifugal rolls can equal the travel of the largest roll tires that can be constructed, and do as much work for the same width of tire."

"Centrifugal rolls run with nearly the quietness of dynamos on finishing work. In roll crushing there is

found for each ore a tire speed that gives the largest output per pound of tire wear. This can only be determined by experience. In most cases this economical speed is found to be far above the turning ability of common rolls. Any centrifugal rolls can run to that speed."

"The wear of a small tire surface, even when running at the tire speeds of the largest rolls, is no greater than that of a large tire having the same velocity. In both cases the same amount of metal is exposed to wear in the same time. The smallest rolls, however, must not be used as coarse crushers."

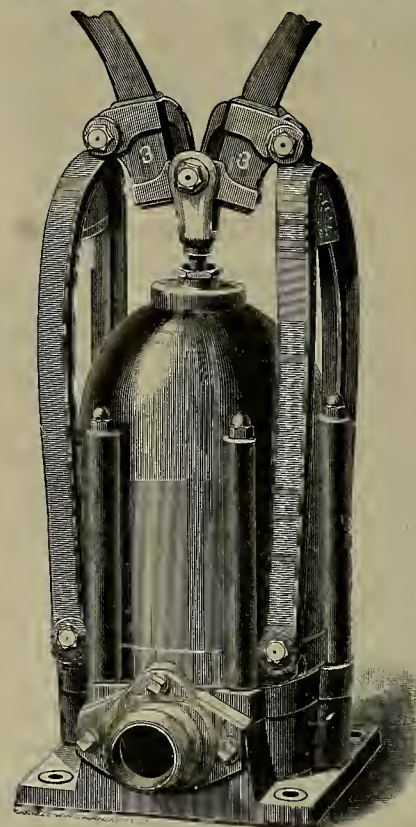
In a handsome circular of crushing and grinding machinery which the Sturtevant Mill Co. of Boston, Mass., issue frequently, and gladly send to inquirers, this matter is further considered.

The Simplon Tunnel.

In drilling the railway tunnel under the Simplon Pass between Italy and Switzerland, the drills used in working the rock are of the rotary type and are worked by water pressure of from 1000 to 1400 pounds per square inch. The water is led through

Diaphragm Lift and Force Pump.

The Edson patent diaphragm lift and force pump, illustrated herewith, as used with the Edson pros-



Edson Diaphragm Lift and Force Pump.

pecting and mining outfit, is made in three sizes, Nos. 6, 8 and 10, with stated capacities of 1000 gallons per hour, one man; 4000 gallons per hour, two men; 6000 gallons per hour, three men, respectively. The manufacturers state that the angular inlet valve minimizes the possibilities of clogging, and that it permits of the free passage of thick sediment, slime and clayey soil.

Regarding this pump W. W. Fisk, manager Boston & Sinaloa M. Co., says: "The pumps work so well that one man can keep a pump going under a head of 15 to 20 feet and keep a good stream of water flowing. We have used them under a head of 50 feet with one man on each brake, and for very fast work at 50 feet elevation we use two men on each brake. They were very satisfactory in every way, gave no trouble and always held their water, even when considerable sand was going through."

Detailed particulars will be furnished by the manufacturers, the Edson Manufacturing Co., 255-257 Atlantic Ave., Boston, Mass.

The Rankin Process.

TO THE EDITOR:—In the process which bears my name I manufacture nitric acid by (A) subjecting dry compressed air at a pressure of 120 pounds per square inch, in a tank 4x8 feet, to the action of numerous electric arcs of peculiar constitution, i. e., as high in ampere quantity as possible, which (unlike the blue static spark) is an orange red, solid flame of intense heating as well as chemical action. This causes the nitrogen and oxygen of the atmosphere to unite chemically to N_2O_3 and N_2O_4 . This compound gas (B) then passes through a transforming vat containing water and powdered silica, which at once absorb the fumes and produce first nitrous and then nitric acid. (C) The nitric acid is then employed to eliminate sulphur, tellurium, antimony, arsenic, bismuth and selenium compounds and other acid elements from the ores, as well as the positive or metallic elements, such as silver, copper, lead, quicksilver, nickel, cobalt, zinc, lime, etc. (D) The residue, which is chiefly silica and gold, is now in condition to be saved by any free milling system, while (E) the solution or filtrate containing copper, silver, lead or other commercial metals is made to deliver up the respective metals by chemical precipitation with use of such reagents as salt and lime, or by electrolysis. With water power we find we can manufacture strong nitric acid for about 3 mills a pound, and with steam, where wood is proportionate to coal at \$3 or \$4 per ton, for about 5 mills per pound, hence can take all ordinary siliceous ores and leach them absolutely free for about \$1 or \$1.50 per ton, saving, besides the gold, any of such metals as silver, lead, copper, quicksilver, cobalt, nickel that may also be in the ore. Of course, the more soluble matter in the ore the more it costs, but I cannot conceive of any ore (even if it were solid lime) that would cost over \$7 to \$8 per ton with the acid at 2 to 3 mills nor is there any common ore of gold, silver, copper

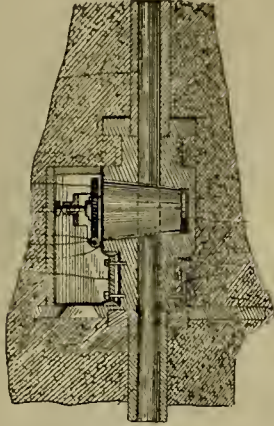
or lead (except the silicate of copper) which is not treatable with the use of different strengths of the aforesaid nitric acid, as any chemist knows.
Pollock, Idaho. H. D. RANKIN.

Mining and Metallurgical Patents.

Patents Issued November 25, 1902.

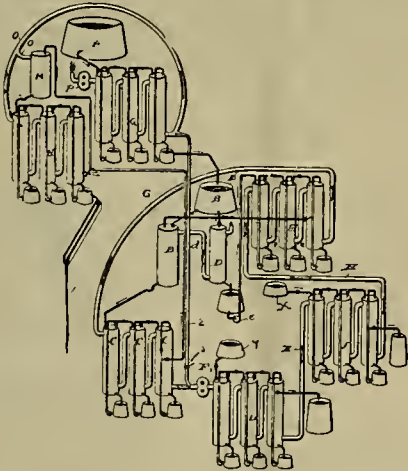
Specially Reported and Illustrated for the MINING AND SCIENTIFIC PRESS.

DEVICE FOR PREVENTING GAS OR OIL WELLS FROM GUSHING, ETC.—No. 714,146; G. R. Cheesman, Auburn, N. Y.



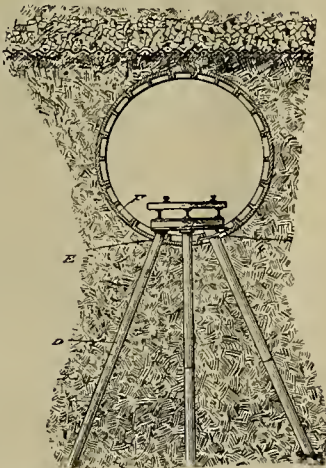
Device for preventing gas and oil wells from gushing, comprising in combination with piping or casing of well, valve chamber secured to upper end of casing, positioned in excavation in ground, struts resting on chamber, planking resting on trusses, and filling over planking, pipe screwed to upper end of chamber, turning valve in chamber, means for rotating valve.

PROCESS OF EXTRACTING BROMINE FROM BRINE.—No. 714,160; H. H. Dow, Midland, Mich.



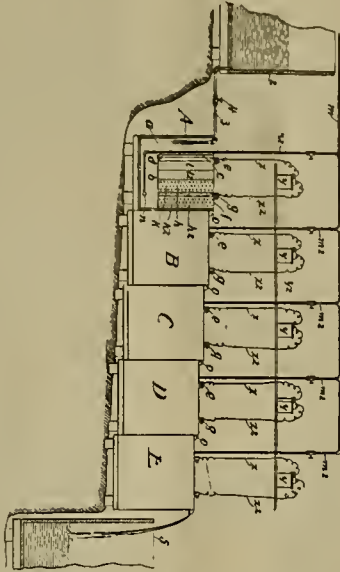
Manufacturing bromine from bromide-containing brines, bringing unoxidized bromide-containing brine into contact with air, subsequently into contact with air containing free halogen.

METHOD OF LAYING TUNNELS.—No. 714,205; G. Lindenthal, New York, N. Y.



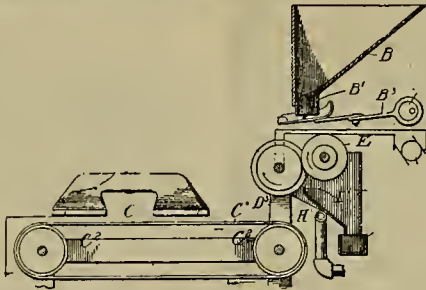
Improvement in tunnel construction producing above path of tunnel, prior to any boring operation thereunder air-resisting zone, then driving tunnel.

PROCESS OF PRECIPITATING METALS FROM SOLUTIONS CONTAINING SAME.—No. 714,599; S. T. Muffay, Bowdre, Ga.



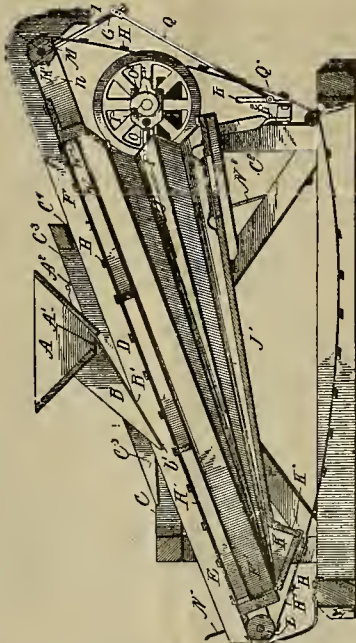
Electro-chemical process for precipitating gold or other metals from solutions, obtaining secondary electro-chemical action by passing solution requisite temperature combined with warm air to supply oxygen through filiform partly soluble composition of lead and zinc inclosed in porous cellular casing of carbon, with suitable plate anode and comprising electrodes having connection with source of electricity.

PROCESS OF MAGNETICALLY AND STATIOALLY TREATING ORES.—No. 714,256; H. M. Sutton, W. L. Steele and E. G. Steele, Dallas, Tex.



The process of separating or concentrating ores by magnetically energizing surface, statically charging same whereby magnetized particles attracted sustain other particles by reason of difference of potential, removal of particles by extraneous magnetic force; first subjecting ores to a combined static and magnetic influence to separate magnetic material, and subsequently subjecting same to direct action of the static electricity.

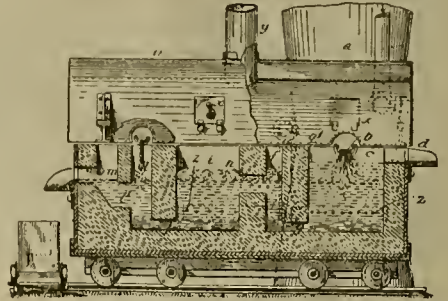
DRY ORE CONCENTRATOR.—No. 714,257; H. M. Sutton, W. L. Steele and E. G. Steele, Dallas, Tex.



In dry ore concentrator, framework, working table thereon, inclined pervious belt movably mounted on table to discharge by gravity at lower end, air

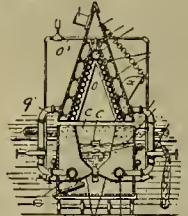
chamber beneath belt having inclined bottom thereto, receptacle within chamber at lower end thereof to collect and retain by gravity metal falling in chamber, means for producing intermittent blast and suction action upon face of belt, means for moving belt during suction action.

CONVERTER.—No. 714,449; G. C. Carson, Redding, Cal.



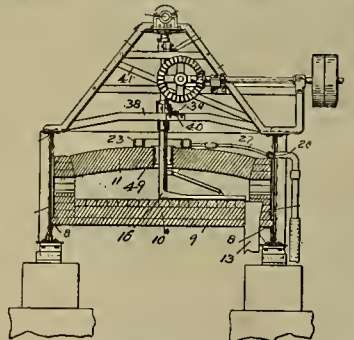
Converter, chamber of V shape, having walls thickened toward bottom tuyeres entering walls and discharging into chamber near bottom, and horizontally extending exit for molten metal at apex of chamber.

PROCESS OF TREATING METAL.—No. 714,450; G. C. Carson, Redding, Cal.



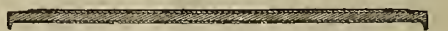
A process of treating molten metals, feeding molten metal continuously into suitable vessel, subjecting metal to action of blast of air delivered near bottom, allowing accumulated slag to flow off from surface of metal, conveying purified metal automatically and continuously from vessel below blast line into upper part of second vessel, subjecting metal in second vessel to action of air blast delivered near bottom of the vessel, allowing slag to flow off from surface of the metal, withdrawing purified metal from second vessel below blast line.

FURNACE FOR ROASTING ORES.—No. 714,464; T. Edwards, Sebastopol, Ballarat, Victoria, Australia.



In combination in a tilting ore roasting furnace, a rabble having hollow stem and foot, stem being formed in sections, water-conducting pipe held in place within lower section by being clamped between two sections, discharge pipe leading from lower section and an inlet pipe leading to upper section.

ORE CONVEYING SURFACE FOR ELECTRICAL SEPARATORS.—No. 714,649; H. M. Sutton, W. L. Steele and E. G. Steele, Dallas, Texas.



Ore-conveying surface comprising insulated body having conducting face upon one surface, means for electrically charging conducting face.

The class journal is distinctively and essentially a journal of progress. In this fact lies its strength and purpose, and the moment it loses that feature, from that time it ceases to occupy a sphere of usefulness in the journalistic field. The trade journal keeps pace with the various occurrences in its particular line: The newspaper details events, the magazine elucidates them, but the class journal leads and directs the thought of its readers into such channels as will best enable them to improve existing conditions and advance their various callings in keeping with the rapid progress of the age.

Mining Summary.

Specially compiled and reported for the
MINING AND SCIENTIFIC PRESS.

ALASKA.

Miners are at work on a mining tunnel at Juneau designed to tap Silver Bow basin to be nearly 2 miles long; stamp mills to be erected on the water front.

All the property of the Last Chance G. M. Co. is to be sold under execution at Juneau December 14th. The plaintiff is J. C. Hile of Philadelphia, one of the largest stockholders in the company, who has a judgment for \$23,000 for money advanced. The company will be reorganized and work resumed.

The Dispatch reports the sale of the Cracker Jack mine, on Twelve-mile Arm, Prince of Wales Island, to H. Bratnaber, for \$200,000.

The Treadwell Co., Douglas Island, is using 150 tons of coal daily. The entire plant is now run by steam power.

The Alaska-Perseverance mine is running band drills, there being no water for power.

Nome reports that Olsen & Yarnell have found 15 feet of pay gravel on their No. 2 claim, Dahl creek, in Kougarok; in a few days they panned out \$1600 off head-rock; the pay streak is on the left limit of the claim and extends into the bench; they are having a steam thawer constructed.

Nome says the mouth of Snake river at Nome is to be changed by artificial means; it has been making its way eastward and north, encroaching on the city.

ARIZONA.

COCHISE COUNTY.

The unwatering of the Tombstone Con. mines is well under way; pump capacity 1800 gallons per minute.

The Prospector says at Tombstone, the shaft is down 640 feet and the volume of water is increasing, but is not yet sufficient to keep the 6-inch sinking pump working to its full capacity of 500 gallons per minute. The water from this pump is forced from the sump to the 600-foot level, from where it is thrown to the surface. The pump on the station is at present run about half an hour on each of the eight-hour shifts. This pump when run to its full capacity will lift 1800 gallons per minute. The six pump men have been divided into three shifts of two men each. The water is run from the shaft in a pipe to a point near the Sterling silver mill, on the Charleston road.

Two months ago a party headed by Captain S. Mitchell visited this section and handed the Gus Baron property, and Captain Mitchell and Mr. Young are at Bisbee to make a payment, take possession of the property and commence work. There are thousands of tons of ore on the dumps. The new owners will put up machinery.

GRAHAM COUNTY.

At the Buckeye Co.'s camp, 8 miles southwest of Bowie, Dos Cabezas mountains, the new fifty-ton concentrator is in operation. A test was made on low-grade ore from the dump, and produced concentrates carrying \$70 to the ton in gold, silver and lead. The mill is now running on ore, averaging \$15 and concentrating eight into one. The ore body dips at an angle of 32°, and has been exposed by erosion for 1600 feet. Entrances have been made at six places, the openings penetrating the ledge on the incline upward. Fifty men are employed; O. B. Todhunter superintendent.

PINAL COUNTY.

At the Bonanza G. M. & S. Co., near Casa Grande, Manager J. C. Loss will install a steam hoist, air compressor, machine drills, and sink the shaft to 500.

The O. D. Co. at Globe has blown in its second furnace and increased the number of men employed at mine and smelter, and the Old Dominion Co. is engaging a large number of new men.

YAVAPAI COUNTY.

(Special Correspondence).—This Territory is an ideal winter camp for the prospector and miner. It is true we have had three or four days of continuous snow storm, which is unusual, but the snow has now nearly disappeared.

The Model G. M. Co. is working nearly 100 men at this camp, mostly on shipping ore, being limited in milling facilities (ten stamps) on account of a shortage of water. This camp is 18 miles east of Prescott. At the Model mine proper, nearly 40 miles southwest of Prescott, they have uncovered a vein by accidentally striking a pick in the side of the shaft at a depth of 300 feet while making repairs. They broke into a vein that sparkles with gold. It is now opened 60 feet along the shaft. The

paystreak is 2 inches wide, which will average \$15,000 or \$20,000 a ton.

This Territory is handicapped by lack of water, but it has an abundance of gold. McCabe, Nov. 28.

Superintendent Bartholdi says he will begin development work on the Verde Chief, near Jerome.

Jerome says Superintendent Giroux is erecting a smelter at the Iron King.

Jerome reports that the United Verde smelter has resumed operations. The smelter was closed down since August on account of fire in the mine.

The snowfall of the past month is without precedent in recent years. All the mountains of northern Arizona are covered with snow. The Hassayampa river, which the past fall has been dry, is again a living stream and is likely to continue as such throughout the coming year. There has been a shortage of water in northern Arizona for metallurgical operations the past three or four years, but the present heavy snowfall will afford an abundant water supply.

CALIFORNIA.

AMADOR COUNTY.

The Bunker Hill mine, near Amador City, which is now opening a large new ore body on the 1400 level, contemplates the addition of several new machine drills. The smaller sized drills have been in use in the mine for some time past.

At the Shenandoah mine, near Plymouth, the shaft is down 900 feet. At 1000 feet a drift will be run to the ledge.

Superintendent W. R. Thomas of the Central Eureka mine, Sutter Creek, is making a comparative test of machine drills in that mine, the compressor plant having been completed.

The South Keystone mines, locally known as the McIntyre property, owned by John McIntyre of Sutter Creek, situated between Amador City and Sutter Creek, is to be opened through the old vertical shaft of the North Star mine. The shaft is 1000 feet deep, but has been flooded for years and the collar of the shaft caved. The cave has been caught up and the process of unwatering the old works will begin as soon as suitable hoisting machinery can be placed on the mine. It is reported that the South Spring Hill workings, from the Talisman shaft, accidentally encountered a pay shoot in what is supposed to be one of the South Keystone veins. It is to explore this ore body and to prospect for others that the new work has been undertaken.

The final payment of \$8000 has been made on the Rhetta mine, near Plymouth, which was bonded three years ago for \$15,000 by W. W. Worthing of the Rhetta Co.; the same company owns the McGee and Kretcher, adjoining the Rhetta, and has the Bay State bonded for \$20,000, about half of which is paid, the properties being worked with a 10-stamp mill, which will be enlarged.

The frame for the new 60-stamp mill at the Kennedy mine, near Jackson, is going up and the mortars will soon be placed in position. Good headway is also being made in the erection of the large new hoisting engines. The new vertical shaft has reached a depth of 2632 feet; sinking has been discontinued for a time; a cross-cut will be run on the 2550 level of the new shaft to connect by raise with the bottom of the old inclined north shaft.

The strike on the 1400 level of the Bunker Hill mine, near Amador City, has now developed 25 feet of \$8 ore, and a drift is being run along the foot wall to further develop this ore body. There is also good ore on the 200 and 800 levels. In view of this showing the company intends to build a stamp mill, the size being determined by the result of further development. A station has been recently cut at the 1250 and a drift started north to prospect for the new ore body on this level. A large new hoist is also in contemplation.

CALAVERAS COUNTY.

The two lowest levels in the Sheep Ranch mine, which are 1200 and 1300 feet respectively below the surface, it is reported, show a great improvement over the 1100 level and the mine is now operating at a profit. This mine in former years was a noted producer. It now gives promise of again renewing the rich shipments of former days. James Langford is superintendent.

The Chronicle reports hydraulic work at the Lancelle gravel mine, near Buckeye; five men are at work.

The Prospect says mining is being resumed at Douglas Flat. Superintendent J. Evans is opening up the Wild Goose and putting in a water-power hoist. Negotiations are pending for the sale of the Ozark mine, near Murphys.

Oil-burning machinery has been installed at the Angels mine at Angels Camp, being the first mine there to use oil.

The air compressor of the Crystal mine, Angels Camp, is in operation.

The Dower and Calaveritas Hill placer

mines, near San Andreas, have resumed. Manager J. J. McSorley has men widening the McDermott ditch. Two miles of pipe have been placed, capable of carrying 600 inches of water, and \$20,000 will be spent in development.

At the Royal mine at Hodson graders are at work for a 120-stamp mill. Fifty men are employed. The new mill will have each battery of ten stamps operated by a separate motor.

Prospecting has been again begun on the north end of Stockton ridge at Mokelumne Hill, in search of opals. Early miners in this district in driving tunnels in the white rhyolite tuff on the ridge found numerous opals but mostly of inferior character. It is believed deeper workings may find the peculiar siliceous secretion known as fire opal.

EL DORADO COUNTY.

Georgetown reports that Eastern men will open up the Rosencrans mine at Garden valley.

Work has been resumed on the Ford copper mine near Georgetown.

GLENN COUNTY.

It is reported that oil has been struck in a hole hole 2000 feet deep on the Nye ranch 14 miles west of Willows. It is the first oil strike reported from this county.

HUMBOLDT COUNTY.

The discovery of gold-bearing veins is reported from Orleans district on Klamath river. A similar report comes from Wilder Creek.

INYO COUNTY.

(Special Correspondence).—In the Morning Star mine is opened up fluxing iron ore, which carries also values in gold and silver. In 1900 were shipped about 400 tons of this ore to Selby's. A control sample of this entire shipment gave an analysis of 40.55% iron, or 58.9% FeO, and only 5% silica. There are hacks of 350 feet of this ore. They are installing a Fairbanks-Morse gasoline hoist in the tunnel to sink 300 feet deeper. They will then go down lower on the mountain and drive another crosscut, which will open up the mine for permanent working. Cerro Gordo, Dec. 1.

KERN COUNTY.

Near Bakersfield, the Mountain Boy, in the Midway, will drill another well. No. 1 yields seventy-five barrels daily.

The Californian says the Southern Pacific intends putting down a well to a depth of 2000 feet, the deepest yet to be drilled in the Kern River district.

The Sunset Crude will build a refinery on its lease at Sunset, to cost \$15,000.

MADERA COUNTY.

The Gambetta mine at Grub Gulch is bonded to a Montana company. Superintendent E. D. North will sink the shaft 200 feet, drift both ways, drive a raise from the 800, put up another oil tank 10,000 gallons. Tanks are in at 800 and station pumps are in place. The Josephine is included in the same bond.

Superintendent Ward of the Rex mine says he will resume as soon as there is water to run the mill.

MARIPOSA COUNTY.

The Mariposan reports a placer strike on the north side of the Merced river, opposite McCabe's Flat. Recently permission was given two miners to work the claims on shares. They tunneled through the reef of rock where earlier work had stopped and struck gravel that paid \$4 per wheelbarrow load. The channel is 800 yards long by 40 to 60 yards wide.

MONO COUNTY.

Bridgeport says there were ten mining and three water claims recorded in November.

The cyanide plant of the Standard Con. M. Co. at Bodie has been closed down for the winter. The slum pond is being emptied for winter use, and the tailings being frozen, it is necessary to blast.

In the Southern Con. mine, near Bodie, the Addenda ledge has been cut at a depth of 500 feet.

NEVADA COUNTY.

The mill on the Allison Ranch, near Grass Valley, is crushing rock from the 800 and 900-foot levels of the mine.

The Conlin mine, near Grass Valley, will resume and will use oil for fuel.

The shaft of the Blue Tent mine, near Nevada City, caved in last week, it is claimed due to the sliding of quicksand, and discovered as the men were changing shifts so no lives were lost. Thirty feet of column pipe was lost. Manager C. Jepson estimates the damage at \$7000.

Near North Bloomfield, the Union Blue Gravel Co. is putting up a mill to crush cement and gravel that cannot be washed.

PLACER COUNTY.

The Bear River G. M. Co., near Colfax, is putting in hydraulic pipe and machinery.

The Gaylord gravel mine, near Auburn, will be opened up by Oakland men. A

hunk house has been built and work is being pushed on the mill and in the tunnel. E. C. Gaylord is superintendent.

S. D. Nesmith will work the Jubilee mine, north of Auburn, and will use the Marguerite mill.

PLUMAS COUNTY.

A group of mines at the head of North canyon, near Greenville, has been sold by Stone & Richards to Droege Bros. of Covington, Ky., E. N. Cornell of Milwaukee and W. Day of Butte county.

Greenville says Eastern men have an option on the Firmstone and Richards properties in North Canyon. The mill will be enlarged. F. W. Day of Butte county is manager.

RIVERSIDE COUNTY.

Acting for Eastern men, J. F. Cullen has bought the Iron Chief mine, near Walters, and will put in a pumping plant, gasoline engine and 4 miles of pipe.

SAN BERNARDINO COUNTY.

Needles says the Federal M. Co. at Vanderbilt are looking for miners; also the Gold Bronze Co. The Gold Bronze mill is running and the mill at the St. George is being installed.

The Mojave, adjoining the Snowball, has been bonded for sixty days, also several mines near Goode Springs and three in the Soda Lake district.

The O. K. group of mines, Virginia Dale district is sold to A. M. Hinckley of Middleboro, Mass., for \$75,000. The O. K. vein is from 2 to 5 feet wide and is developed to a depth of 300 feet. These mines are in a range of mountains about 50 miles from the nearest railroad station. Water is obtained from a dry lake on the north side of the range.

SAN DIEGO COUNTY.

The Miner says near Julian, Superintendent G. H. Moyer, Boulder Creek M. Co., is pushing the development work on the Pandora claim. Feeler & Moor are developing the Last Chance.

The Union reports a smelter for Julian by a corporation of Los Angeles men—the Julian Reduction Co. The reduction works and furnace will have a capacity of 100 tons per day; the Weist process will be used, as the ores of this district contain sulphides and sulphates of the baser metals. The principle is to set free values in refractory ores by chemical action, produced by a flux, which is an oxidizing agent, little heat being necessary to start chemical action—400° to 600° F. Wood can be used for fuel. This heat is not high enough to volatilize the gold or silver, while the baser metals will be oxidized and pass off.

SHASTA COUNTY.

At Redding, the Gold Mountain M. & M. Co. has incorporated to operate properties on Salt Creek in the Shasta mining district; D. N. Honn, F. L. Honn, E. P. Conner, J. G. Conner and A. Bell.

At Old Diggings, near Keswick, the Texas and the Evening Star mines have shut down, due to the smelter strike at Keswick, as their ore was shipped to the smelter.

As a result of the strike of smeltermen and miners at the Mountain Copper Co. and the closing down of the Iron Mountain mine and Keswick smelters, the Northern California Power Co. will suspend work on the Cow creek electric power plant now in course of construction. This will make 100 men idle and may prevent the installation of this plant, which was to have been the largest power plant in northern California. Superintendent Johnson has been directed to suspend work, pay the men and discharge them. The strike situation is unchanged.

The Connors G. M. & M. Co. has received its incorporation papers. It was first organized as the Clear Creek Co., but changed as there were already several companies doing business under that name.

Construction of the electric power line from the main line of the Northern California Power Co. to Bully Hill mines is approaching completion. The introduction of electrical power at the mine and smelter at De Lamar will effect a saving to the company more than it has to the Mountain C. Co. at Keswick and Iron Mountain.

The mine and mill at Bullychoop are giving employment to about sixty men. The new 10-stamp mill and 5-foot Huntington mill are running. The mill did not run steadily last month, but 1400 tons of ore were treated. There has been a foot of snow at the mine.

SIERRA COUNTY.

The Bellevue (Thistle) tunnel, near Sierra, is in 4000 feet; although it starts in Sierra county, it is headed for gravel in Plumas. An average of 75 feet per week is made.

SISKIYOU COUNTY.

The Quartz Hill mine at Scott Bar has been incorporated by New York men, as the Scott River G. M. Co. Machinery,

steel pipe, etc., is being forwarded to reconstruct the ditches, flumes, pressure pipe for power plant, which will be followed by a 40-stamp mill. J. F. Boyle is manager.

Superintendent Turner is pushing the work at the Cherry Hill quartz mine on Cherry creek with thirty-five men. The mill has resumed.

The cold spell last week stopped the water flow in the small streams, causing a suspension of mining in the placer diggings.

D. Jones, representing an English syndicate, has been inspecting the coal mine at Herr's ranch, between Yreka and Ager, with the superintendent, B. A. Cardwell, with a view to purchase, the intention being to put up smelter, coke ovens, etc., and to build branch railroad to main line of S. P. Co.

TRINITY COUNTY.

(Special Correspondence).—At the Dorleska mine, on Coffee creek, a large body of gold ore has been encountered. Last week and the week before thirty pounds of gold was taken from the mine. The property is owned by Los Angeles capitalists, among them United States Marshal Osborne. The company will in the spring add new machinery and make improvements. The Three Peaks, adjoining the Dorleskas, and of which J. J. Chambers is general manager, is said to contain ore of a similar character.

Redding, Cal. Manager J. Porter, Fairview mine, near Trinity Center, last week shipped the first bullion from the new 10-stamp mill—a \$5000 bar, the result of less than a month's run. The company purchased the Fairview mine last spring for \$60,000; and built a road from a junction with the French Gulch and Trinity Center road to the mine, a distance of 12 miles. A 10-stamp mill was erected, a store, mess house and other buildings, at a cost of \$40,000.

Work is being pushed on the mill at the Three Peaks mine and the stamps will be dropping next week.

E. Wallace is working the Snowflake ledge of the Schroeder group at Deadwood, and also the mill.

TUOLUMNE COUNTY.

At the Mohican mine, near Groveland, Superintendent Chappellet intends to sink another 100 feet, says the Independent. The Maryland, adjoining the Mohican, will also resume.

At the Golden Rule mine, Stent, a new ore chute was built during the shut down.

At the Bell mine, at Tuttle town, Superintendent W. J. Rule is driving levels north and south at the 400 and has the shaft down 450 feet. A test run of rock is being made at the Sutton mill.

W. L. Holmes of Detroit, Mich., has a bond on the Mapes group of mines at Yankee Hill, \$10,000 to be paid in two years, the balance on basis of 15% of gross proceeds. Machinery will be installed. G. W. Mapes is superintendent.

The Electric M. & D. Co. has incorporated with San Francisco men to work the Electric mine, near Sugar Pine. G. C. Kirby, W. McMurphy, J. R. Foley, E. Woodward; G. C. Kirby is superintendent. A shaft is being sunk and a hoist and a 10-stamp mill put up.

At Quartz the incline shaft at the Dutch mine is down 1420 feet. Connections are being made on the No. 13 level with the winze sunk from No. 12 level.

About forty men have been put to work at the App mine. The mill has resumed.

Men were put to work in the Jumper and Golden Rule mines at Stent last week. Superintendent Kerr has given orders that no man who is unable to understand and speak the English language will be given work in these properties. The sixty stamps in the Jumper mill are dropping.

Near Columbia the Densmore mine is running and the stamps are dropping in the mill.

At the Altadena mine, formerly the Kearsarge, hydraulic pipes and machinery are being laid down. This property is under bond to San Francisco men. A 10-stamp mill will be erected.

A new company has secured a bond on the John Royal mine, owned by E. C. Day and others, and will erect a 10-stamp mill.

The \$50,000 damage suit of D. Manning against the App M. Co. resulted in the jury awarding the plaintiff \$5000. In February last the plaintiff while at work at the 1100-foot level of the App mine was crippled by being struck with a timber which fell from the skip.

A new find has been made on the Baker ranch, near Carters, at a depth of 70 feet. The formation is granite.

The river channel has been struck in the Ranch mine, near Columbia, by a shaft 110 feet deep. The operators have a bond on the property for \$16,000.

YUBA COUNTY.

Work on the quartz claim of the Eagle Canyon M. Co., near Marysville, is being pushed, and an 8-foot vein is opened up

assaying \$4.50 a ton. A mill will be erected in the spring.

COLORADO.

ARAPAHOE COUNTY.

A smelting plant, backed by large capital, is under consideration by railroad and financial men of Colorado and the East. The project is the largest smelter undertaking ever known in Colorado, with the exception of the smelting trust, which is capitalized at \$100,000,000. The company is independent from the trust.

BOULDER COUNTY.

The St. Louis mine on Boulder mountain at Cardinal, is running three shifts sinking the shaft. Manager Haberl expects that with the development now being done to keep the mine running constantly next summer, and says that deep mining is what is required to prove up the mines on this mountain.

The Sweet Home Co. on the same mountain are pushing their tunnel level and have opened up a fine body of milling ore.

In the Anchor property, west of Caribou on Idaho mountain, miners have opened up a fine body of ore under the management of Charles Wolf & Co.

A. Trollope is working a crew on his property at Cardinal and obtaining good values. It is thought that he has the east extension of the big Cardinal vein of the Boulder County mine.

The people owning the Boulder County mine have encountered ore bodies in recent development work. They are treating 600 tons a month in their mill. In one of their workings is reported 9 feet of \$50 ore.

The Longfellow, near Eldora, reports a 30-inch body of smelting ore opened, running \$200 to the ton. The ore is an iron sulphide with calaverite.

CHAFFEE COUNTY.

Developments in Granite district during the past months led to the belief that the ore will be opened in sections of the district not previously regarded with favor. The old producers lie to the east of the town. North, south and west prospecting is being done. The formation is granite. In this are the Magenta, Yankee Blade and Robert George. In these mines has been found rich ore in narrow veins. High freight and treatment charges made the profits small and the discovery of Leadville diverted capital from their development. Colorado Springs men have acquired several of these old mines and are developing them with prospects of financial success. One of the mines in this section of the camp is the Washington, owned in Colorado Springs by Messrs. Noble, Stubbs & Parker. The smelting ore varies in width from 6 to 18 inches. Its value is said to be \$40 to \$80. The gangue is decomposed granite and is said to average from \$4 to \$7.

The first gold brick from Granite, the result of a trial run on low-grade rock at the Magenta mill, was shipped out last week.

G. M. Webster has located a 4-foot vein of gold ore in the Sangre de Cristo mountains that assays \$35.

The management of the Columbus mine at Monarch has recently made a thorough investigation of the property and decided to build a plant with which to treat the ore. This is an old producer.

CLEAR CREEK COUNTY.

At the Terrible, near Silver Plume, a compressor is being installed and work on the new mill is being pushed.

The St. Paul G. M. Co. is preparing to start work on the Lone Jack lode. A tunnel has intersected the vein 250 feet below the main shaft, in which there is a large streak of good ore.

Another contract has been let on the Buckeye State group, on Democrat mountain. There are several streaks of ore in the breast of the drift. The ore carries lead, silver and gold.

J. F. Stanish is grading for a building preparatory to the installation of a hoisting plant on the Last Chance group, on Silver creek. There are 10 inches of ore in the shaft worth from \$150 to \$200 per ton.

Idaho Springs reports a 6-inch shoot of three-ounce gold ore on the Mona claim of the Sylvia G. M. Co.

The Donaldson Mt. M. Co. will resume. The tunnel to be driven 3000 feet to prospect Mt. Donaldson is in 200 feet.

The mill of the Idaho Springs M. & R. Co. has been sold to Denver men.

The Cleopatra, at Empire, is sacking ore from the face of the tunnel.

At the Seaton mine on Seaton mountain development work on the ninth level has opened a large ore body. In several of the steeper large bodies of ore are exposed, but the machinery on the mine is being taxed to its full capacity. M. S. Rosenthal, secretary of the Seaton Co., intends installing a new plant which will include an air compressor.

R. C. Vidler reports that the Vidler tun-

nel property, near Georgetown, is to be incorporated and the tunnel driven rapidly. Early in the spring the water-power plant will be constructed and power drills employed.

The Notaway M. Co. contemplate sinking a new shaft at the point of junction of several veins on their property, which will eventually become the main shaft of the mine. This will necessitate a new hoisting plant.

The Seaton mine has been opening up new ore bodies below the 700-foot level, making an average output of 700 tons per month. In making an upraise from the ninth to the eighth level a body of smelting ore, running four ounces gold, sixty ounces silver and 20% lead, was recently found.

In the Alpine, at a depth of 350 feet, the ore body consists of 10 to 14 inches of copper and lead, the values being \$75 per ton.

CUSTER COUNTY.

The Florence M. & S. Co., near Custer City, are driving a tunnel on the Combination, one which will open up the Summit and Nebraska claims.

EL PASO COUNTY.

Potvin Bros. have a lease on the Lexington Co. property north of the Gold King, near Colorado Springs.

FREMONT COUNTY.

The copper reduction plant at Parkdale of the Greenbaven Mountain M. & M. Co. is completed. The mill has a 75 H. P. engine to run the dynamos and combined air and steam compressor, also a Leyner heater. The pulverizer has capacity 150 tons daily to sixty mesh. This machine has three cylinders in one frame independent of each other; each cylinder has a horizontal shaft on which are eight steel arms, to which are bolted paddles of phosphor bronze running 1600 revolutions per minute; two run in one direction and the others opposite, with a current of air forced in under the feed. The pulp is drawn from the cylinders by a suction fan to the dust chamber, where it is conveyed by elevator to ore bins. The pulp is next put into a wooden tank, where the chemicals are applied; the copper and gold are reduced to a chloride. The process is the old patio or leaching process, with the addition of hot air to aid in reducing the pulp in twenty minutes instead of four days.

The United States Reduction & Refining Co. at Canyon City are to make extensive changes and improvements in their lead-zinc smelter. A sampling works is also to be added to the plant.

GILPIN COUNTY.

The Pewabic group, near Central City, has been unwatered and miners put at work cleaning out the Richardson workings. It is also expected that work will begin on the Iron mine.

The Avon M. & M. Co. have the San Juan mine on Quartz hill, and are repairing the machinery and shaft building. The ore will be shipped to the Avon Co.'s mill in East Nevada.

Central City reports hoists and shaft buildings are being put in at the Belden mine, Chase gulch, and also at the Haseltine mine, Russell gulch. Sinking is resumed at the Fairfield mine, Russell gulch.

The Fostoria M. Co., B. M. Myers of Central City manager, has bought the Hall ranch, Pleasant Valley district—eighty-seven acres patented ground—and will put in a gasoline hoist and electric motors to operate drills, pumps, etc.

Central City reports that the Gauntlet G. M. Co. will resume work and sink the main shaft on Quartz hill to 400 feet. At the Barnes mine the shaft is down 700 feet.

At the Lotus mine in Russell district drifting is in progress at a depth of 550 feet on the west side of the shaft to catch the vein on that side with greater depth. A raise is being made to the upper level. The water is kept below the 550 level, being lifted to the first level by a steam pump. Sternberger Bros. own this group. They are also sinking a new shaft on the Peck claim to the east of Leavenworth gulch. The shaft is down 70 feet. A small building and steam plant has been put up. F. G. Wood is superintendent.

At the Fairfield mine in Russell district the shaft shows a crevice of free milling ore alongside of which there is a streak of yellow copper smelting ore a foot in width. Drifting is being carried on in the lower levels. Several tons of ore have been shipped to the Treasure mill at Black Hawk. A carload shipment of smelting ore will be made to the Denver smelters. This class of ore runs up to \$150 per ton. R. Broad is superintendent.

At the Forfar mine on the Pewabic mountain the water is below the 140 level and ore is being taken from the 70-foot level. Lessee E. S. Moulton will make a shipment of from seven to eight cars of the ore to the Rocky Mountain plant at Black Hawk, and will then unwater the

property to its fullest depth of 300 feet. A gasoline hoisting plant and building was recently erected.

The Bona Venture Con. M. Co. is retimbering the Pewabic tunnel, south of Russell gulch, and snow sheds built at the mouth of the tunnel. T. M. Skinner of Denver is in charge. Work will be resumed in the main tunnel, it being in 1000 feet. There remains 100 feet of further driving to intersect the veins, five in number.

Eastern parties have started development on the Russell & West Pewabic property in Russell district and put up a new shaft building. Sinking is in progress with three eight-hour shifts, and the shaft is down 200 feet; some yellow copper ore showing in the bottom. A Thompson is superintendent.

Sinking has been stopped at the Robert Fulton mine at the head of Graham gulch by the Russell Gulch M. & Dev. Co. The shaft is down 240 feet. Drifting has been commenced at that depth. The company is taking out ore which is being shipped to the Idaho Springs concentrators.

Manhire Bros. have their new building completed on the Kemp-Cushman mine at the head of Leavenworth gulch and have put up a plant of machinery. The shaft shows a streak of smelting ore.

HINSDALE COUNTY.

Arrangements are being completed for resumption of work at the Golden Fleece. The remodeling and rebuilding of the present mill are contemplated.

JEFFERSON COUNTY.

At Golden, Manager F. R. Carpenter has one of the furnaces of the Clear Creek S. & R. Co. out of blast, owing to a shortage of limestone. The company is hauling limestone from beyond Pueblo and the plant is running only on the residue on hand. It owns quarries within a few miles of the smelter, but the roads are bad at this season.

LAKE COUNTY.

The Sharp Gold Mining Association is to be organized for investigation of Leadville Basin. Operations will begin on the west side of the basin.

The recent strike in the Chautauquan shaft of the Forest City M. Co., on Little Ellen hill, is improving. The sulphide ore at the 160 level still holds out, the oxidized material has widened to 4 feet, assays give gold, silver and lead \$50 a ton. Manager Carpenter says the property has the appearance of making a mine.

Under the new schedule which the smelting company has made on low-grade iron there is an increase in iron production of Leadville. The Sixth Street shaft is taking out 250 tons per day, and mangiferous iron ore, which contains a few ounces in silver, is now being mined in other properties. The Caribou is preparing to increase shipments of iron, and will by January 1 be producing 200 tons a day. A year ago the best smelter returns on down-town iron were between \$4 and \$5, but now the best average is from \$3 to \$3.50, due to the fall in silver and a slight deterioration in grade.

Unexpected geological conditions have been found under Brece hill in the Yak tunnel. Heretofore it has been the belief that the sedimentary formation had practically been displaced on Brece hill by the igneous rock. The finding at about 1300 feet from the surface of about 400 feet of limestone and quartzite is considered of great importance from the standpoint of prospective value.

E. W. Keith, representative of the Cherokee-Lanyon Spelter Co., of Gas, Kan., is shipping to that plant thirty tons daily of siliceous ores. The company treats zinc-iron sulphides for making spelter. After the extraction of the zinc the residue of the ore, representing 50% of the raw material, still contains values in the precious metals and also lead. The company has a seventy-five ton furnace to treat this material and is drawing on Leadville for its siliceous mixture. The minimum limit is \$15 ore.

Near Leadville, Manager Cooper is pushing development work at the Cady shaft of the Progressive M. Co. Ore has been opened up in the south drift, a sample running 42% iron and manganese, and silver \$2.80. This iron body is 15 feet from the shaft and in the flint. The lead carbonate body has been followed 14 feet and a winze started in the drift; ore bins are being built. Assays from the bottom show .08 of an ounce gold, 32.3 silver and 31.5% lead.

The Chippeewa M. Co., owning the ground on Brece hill where the Chippeewa L. Co. is working, has declared two dividends of $\frac{1}{2}$ cent each, a total of \$2500, making four dividends paid out of the royalties received by the company.

OURAY COUNTY.

Owners of the Ouray Chief at Ouray intend to put in air drills. New houses have been erected and a road built to the mine. A rich vein of ore has been found.

At Ouray the Caroline M. Co. has

started its new power plant. It is of 500 H. P., and with the other three power houses will furnish power enough to work the shaft of the Revenue.

RIO GRANDE COUNTY.

Reynolds, Palmer & Schuch are to attempt to work the Reynolds ores by cyanide and machinery will be ordered.

SAN JUAN COUNTY.

At the Anglo-Saxon tunnel, owned by the Gold King M. Co., a new building, 18x24, has been erected, and a new 50 H. P. engine installed for running the compressor.

Mr. Neigold states that a mill will be built for the Neigold properties in Cunningham gulch as early in the spring as possible.

A force of fifty men is employed at the Black Prince mine on King Solomon mountain. Many are carpenters erecting necessary buildings and extending the Contention tram to the property.

It is reported that the Silver Lake mill at Silverton is to be enlarged to a capacity of 1000 tons per day.

A. Saenger is developing claims on the Cement creek slope of Boulder mountain, and ore showing lead and copper and carrying gold values has been found. Neef Bros. of Denver are interested with him, and development will be started in the spring. There is 4 feet of concentrating ore, with a 2-foot rich streak. A shoot of tungsten ore has also been found in one of the veins.

SAN MIGUEL COUNTY.

The last annual report of the Tomboy Gold Mines Co. for the fiscal year ending June 30, 1902, has been made public and shows a net profit of \$387,275. There was mined and milled 85,726 tons of ore, which yielded \$356,065 in gold bullion. The working expenses were \$501,748, or \$5.85 per ton. The manager, J. Herron, says requirements in new properties, purchased and under bond, made it necessary to limit development work in the old mine. The development performed was: Drifts 1357 feet, raises 253 feet, crosscuts 28 feet.

During the year the Tomboy proper produced 48,644 tons of ore, which yielded \$329,232, an average of \$6.77 per ton, at an expense of \$257,468, a profit of \$71,264.

Manager G. R. Pickett, Carbonero mines, near Ophir, reports an 8-inch streak of galena in the crosscut. The main vein is galena and lead carbonates with gold and silver, netting \$50 per ton.

The 30-stamp addition to the Ophir Con. mill, at Ophir loop, is in operation, making fifty stamps, treating ore from the Ida vein, free milling the bulk of the values being saved on the plates.

It is stated by the managers of the several important mines about Telluride that all of the mines, excepting the Smuggler-Union, will continue work throughout the winter. Indications point to a long shut-down at the Smuggler. The horses and mules used in the mine have been taken to the valley. All movable machinery and tools are being taken from the mines, and changes all tend to justify the report of a permanent closing.

TELLUR COUNTY.

(Special Correspondence)—Shaft No. 2 of the Portland G. M. Co., Victor, is down 1250 feet, are hoisting 600 tons per day with cages, will install three skips instead of cages, skips each hold 70 cubic feet. Each trip of the engine will hoist a three-ton load, or 1000 tons per day. This is something new for the Cripple Creek district. The skips will dump into side-dumping surface cars with 80 cubic feet capacity which will be self-dumping and hauled out on the dump with a rope haulage. The waste rejected from the ore house, after passing through the washer, will be elevated back up to the collar of the shaft and hauled out on the dump by the same cars and haulage. By this means they will do away with several top men and ore-house trammers and reduce the expense of operating considerably. This mine, along with other mines of the district, commenced with high-grade ore and was not expected to handle large tonnage, but as the mines increased in depth the ore is lower grade and large tonnage is now the main feature. They will install belt conveyors for sorting the ore. The ore is a concentrating proposition, but instead of concentrating by machinery it is done by hand. Instead of the values being in the heavy material, they are in the light, and anything in the way of mechanical separation of the ores must have that fact in view. The ores have always been handled automatically so far as saving the fines by screening, but the material that is not screened has to be sorted by hand.

Several schemes are either in use or in contemplation for cheapening ore sorting by means of washing the ore before it is sorted, then sorting it on belt conveyor instead of tables. It is understood the Gold Coin mine has a washing and sorting

device of that kind which seems to be giving good results.

The Taylor & Brunton sampler at Victor, known as the Portland plant, is handling about 300 tons per day.

The Strong G. M. Co., Victor, consider that they have demonstrated that the ore extends into the granite. They are now taking out ore 500 feet from the contact. The shaft is 900 feet deep; hoisting goes on from the different levels.

The Economic G. Extraction Co., Victor, are running full capacity, treating ores from Woods Investment Co. properties as well as custom ore.

Victor, Nov. 30.

Ore is being shipped by six sets of lessees operating on the Free Coinage ground at Cripple Creek.

Masons are rebuilding the wall of the Economic mill, Cripple Creek, which collapsed last week.

A leasing company has taken a three-year lease on the property of the Glasgow G. M. Co. on Iron mountain. Work will be started on three claims. In one is a vein which assays from \$14 to \$29.

Reld and others, leasing the Burns of the Acacia Co., have installed a new plant. A strike was made a few days ago.

Ferguson & Co., on the Zenobia, have made a discovery at the 350-foot level in following what was believed to be a slip, and are breaking 3 feet of ore that will average two ounces to the ton.

Sifton & Co. of Colorado Springs, who bought the lease on the Grace Greenwood, have begun mining under Superintendent Friar. The ore body lies at a depth of 25 feet from the surface. It is 10 feet wide, and has been opened laterally 30 feet. Its value is \$25 in gold to the ton.

Hansen and others, lessees of the Zoe on Beacon hill, are breaking ore at a depth of 400 feet. The shoot is 4 feet wide and was discovered near the bottom of the shaft. It runs \$50.

In the Empire State mine, on Bull hill, Cripple Creek, only development work has been done during the past eighteen months and eight veins found, all carrying pay values; the largest was cut at the 750-foot level, where a drift has been run on it 265 feet. Two drifts have been run along the basalt dike, showing a width of 40 feet. No stopping has been done, and only two small machine drills have been working on ore. The screenings from this ore have averaged \$50 a ton, and the coarse rock \$25. The same dike has been cut at the fifth level, but it has not been explored. In vein No. 2 three-fourths of the vein is pay. In the seventh level a wide body of ore runs as high as 40 to 150 ounces in silver and five ounces gold, and also some gray copper.

The following is cabled to London office of Stratton's Independence mine: No change as regards the character of the mine. Extracting the ore from bunches in the upper levels. Have several months of ore assuredly remaining in the upper levels with probability of finding other bunches of low-grade ore in ground abandoned by former owner. Very little doing on 1400-foot level owing to excessive influx water. Will resume explorations on that level on arrival large pump next month. On 1150-foot level ore continues spotted in character. The general average for distance of 250 feet does not exceed four pennyweights per ton for stopping width. Raises above this section show some improvement in value, not significant as yet.

At Cripple Creek, the lessees operating on the estate of the Anaconda Co., shipped 500 tons of ore in November. Of thirty-five leases from ten to fifteen are making a good showing. Superintendent D. Falvey has resumed work on the Burns shaft of the Acacia Co. and shipped thirty tons of ore recently, which returned \$50 per ton.

S. H. Guyot of Boston reports that he has sold the Black Wonder and M. C. lodes, on Bull hill, to a Boston syndicate for \$50,000. The properties adjoin the Vindicator, Theresa and Golden Cycle.

The gold production of Cripple Creek district for November was \$1,901,250, from 61,400 tons of ore, or about \$31 per ton.

A strike is reported in the Empire State mine at Cripple Creek. This property joins the Isabella, which two and a half years ago produced ore of phenomenal richness. It is supposed that this new strike is a part of the Isabella zone.

The War Eagle mine at Cripple Creek reports a new find at a depth of 60 feet in what is known as the Mud vein.

General Manager F. M. Woods reports a strike in the Deadwood shaft of the United Mines Co. at Cripple Creek. The vein is 40 inches in width.

Arrangements are being made to lease the Stratton estate properties in Cripple Creek. There have been a large number of applications.

Manager A. H. Heller of the Arequa mill and cyanide plant, near Cripple Creek, has bought the Wild Horse dump. The

estimated tonnage of the dump is 20,000 and the average value \$5.

Cripple Creek says the Black Wonder and N. C. claims on Bull hill have been sold to Boston men for \$50,000.—A 3-foot vein of ore has been opened in the Dexter claim on the west slope of Bull hill.

The Midox M. Co., operating the Atlanta of the Gilpin & Cripple Creek Co., shipped thirty tons of screenings that returns two ounces.

IDAHO.

ADA COUNTY.

The News says B. M. Baker of Salina, Kan., proposes to erect a 20-stamp custom mill and roasters at Boise.

BEAR LAKE COUNTY.

The Claire Copper Co. at Montpelier proposes to erect a smelter and treat ores also from the Copper King, the Duke and the Elk.

BLAINE COUNTY.

The Times says the Oswego mine, near Halley, will resume.

The Minnie Moore mine at Bellevue is working 100 men. Two carloads of ore are shipped daily.

BOISE COUNTY.

A 5-foot ledge of cobalt ore is reported in the breast of the lower tunnel in the Standard mine, at Quartzburg. A carload of concentrates shipped contains 8% copper, 6% cobalt and \$50 gold.

IDAHO COUNTY.

The Idaho-Comstock property, which has been idle for two years, is now in operation again with an increased force.

Neal says the Daisy mine is sold to the Western T. & G. Co. for \$225,000. A 10-stamp mill and concentrator is on the property.

Thunder Mountain reports the intention to put in a concentrator at the Wordenhoff group on South creek. A 10-stamp mill has already been ordered. The Dewey mill last week sent out a \$10,000 bar, the result of a seventeen days' run.

Elk City reports the owners of the Sherman property intend to put up a 20-stamp mill.—In the Buffalo Hump country, 26 miles from Elk, are five stamp mills in operation.

In the American Eagle at Elk City a raise is being driven from the lower tunnel. Work on the mill is being pushed.

Hogan Bros. have closed down their mine for the winter, being unable to obtain power for the mill. The water in the ditch became frozen. The ditch is 5 miles long and they began covering it too late in the season. The ore is low grade and is quarried, three miners being able to break enough ore for a 20-stamp mill crushing eighty tons daily.

R. Leggett of Butte et al. have taken a bond on the Pacific group. Five feet of ore has been opened up in the tunnel at a depth of 130 feet which assays \$10 a ton.

OWYHEE COUNTY.

The Bullion group of claims on Potosi mountain, near Silver City, have been bonded to J. E. Mosher, for \$40,000.

The south drift in Sinker tunnel, near Silver City, is said to be in Mahogany ground, with ore 7 feet wide, and assaying \$15 per ton.

SALT LAKE COUNTY.

Secretary Lamb, Silver King M. Co., Salt Lake, has posted the regular dividend of \$100,000, or 66 2/3 cents a share, payable December 10, an aggregate for the year of \$1,200,000.

SHOSHONE COUNTY.

It is estimated that 3000 men are working in the mines of the Cœur d'Alene. At Wardner, 1000; Canyon Creek—Tiger-Poorman, 50; Mammoth, 140; Hecla, 100; Standard, 245; and Frisco, 250; Mullan—Morning, 250; and Hunter, 50; at the California, up Nine Mile, 45; at the sampler below Wallace, 35; at the mines at Murray and Prospect, 400 (estimated); at Hercules, 50; and prospectors working their own claims throughout the district places the number at 3000.

The Frisco mine, at Gem, which has been idle for eighteen months, will resume operations in a few days with a force of 280 men. The Frisco will output 2000 tons of concentrates per month, the mill having a capacity of 850 tons of ore daily. There is enough ore blocked out for twelve months, and with new development work the ore reserve can be kept ahead of the mill's capacity.

The lower tunnel at the Reindeer, near Mullan, is in 300 feet and has 500 feet more to drift before cutting the ore shoot. The contract for 200 feet of tunnel on the Alice group in Reddy's gulch is completed, but work will be continued.

Manager A. M. Strode of the Stevens Peak M. Co., near Mullan, has so far met with good success. He is manager of the Stewart M. Co., operating in Government gulch, and also manager of Reindeer C. Co. The Stevens Peak property lies south of Mullan a short distance. Consid-

erable development work has been done on the property. At present the company is running a tunnel to tap the lead at a depth of 850 feet, and is now in 1500 feet, having another 100 feet to drive.

After four years of rock cutting the Bunker Hill & Sullivan Co. has connected every opening in its mines at Wardner, with the tunnel, the mouth of which is at the mill 2 miles below.

INDIAN TERRITORY.

CREEK NATION.

At Keystone, 20 miles west of Tulsa, a discovery of large deposit of zinc and lead has been made. Lahorers blasting on the Arkansas Valley & Western grade hlew the side off a bluff along the river and exposed a deposit 40 feet in thickness.

ILLINOIS.

POPE COUNTY.

The Empire lead and spar mines on the Illinois Central Railroad have shipped the first carload of zinc ore ever mined in the State of Illinois. This mine is on land owned by Mrs. William McKinley, and was operated by the Saxtons for several years after the Civil War for spar and lead, but they found so much carbonate of zinc that they abandoned it.

MICHIGAN.

HOUGHTON COUNTY.

The Michigan mine management has decided to build a mill. It has not been determined where will be the most advantageous place to locate the mill. The company has three sites—one on the river near the mine, another at Redridge and the other at Four Mile Rock, down the lake from Ontonagon. This latter place contains many good features and it is probable that the company may decide on this site.

Two of the three heads of the Adventure mill are crushing 400 tons of rock daily. A month has elapsed since stamping was begun, and already it has been necessary to take portions of the machinery of one head to replace damaged parts of others.

The death of T. H. Mason of New York, president of the Quincy M. Co., leaves the future management of that property in doubt. Since the death of the elder Mason, two years ago, the management has devolved upon W. R. Todd, who has made a number of innovations and has changed the personnel of the local staff. The Quincy is earning \$600,000 yearly.

A winze will be sunk on the lode from the bottom level of No. 2 shaft of the Tamarack, Jr., Houghton, to show character of lode up to Calumet & Hecla line without the expense of sinking a shaft and crosscutting. No. 1 shaft has been abandoned.

MONTANA.

BEAVERHEAD COUNTY.

The Tombstone M. Co. has bought two mining claims near Dewey, in the Dewey Flat district. The vein is gold bearing ore, assaying \$10 per ton. The 10-stamp mill will be enlarged. The ore is free milling.

DEER LODGE COUNTY.

Anaconda says the main shaft on the Ravin mine in Centerville is being sunk to the 500-foot level by the lessees. The Ravin rock is a copper-silver ore.

FERGUS COUNTY.

The Alder Gulch M. Co., near Lewistown, is cutting lumber for a cyanide mill. Two tunnels, 400 and 150 feet, are being driven.

The ditch that is being taken out by the Gold Reef M. Co. from the head of gulch to the Gold Reef mill, near Gilt Edge, will be completed this month. It is 3 1/2 miles long. Thirty men are at work.

FLATHEAD COUNTY.

Manager D. P. Bowers, the Rustler M. & M. Co., near Libby, says the company will build a branch line of 20 miles from the Snowshoe mine to connect with the Great Northern railroad.

GRANITE COUNTY.

C. F. Chapin, manager of the Sunday mine of the Montana G. M. Co., near Phillipsburg, is shipping ore to the smelter in Butte. The mill on the ground crushes only the low-grade rock, but it is the intention to install a plant to handle the entire product.

MADISON COUNTY.

The Norwegian mine, in Norwegian Gulch, has a vein of \$116 rock, 2 to 20 inches wide.

F. Field has finished cyaniding the tailings at the Easton mill, near Junction. His summer's work yielded three bars of bullion weighing 4730 ounces, with a high percentage of silver. He has installed a plant to work the rock of the mine during the winter.

The Daisy Bell mine, near Parrot, is reported bonded to Butte men.

M. Field of the Easton mine reports that he has the new cyanide plant nearly

completed. As there are several thousand tons it will take nearly a year to clean up the dump.

MISSOULA COUNTY.

The second payment on the Monitor-Richmond group, near Saltese, has been made. The claims are under bond to the Bitter Root C. M. Co. for \$200,000. Manager H. F. Welsh says \$50,000 has been spent in development since June last; forty men are at work. On the Monitor the shaft is down 200 feet on an ore body 15 feet wide, carrying 8% copper and \$5 gold. On the Richmond are four shafts, average 100 feet deep, opening the lode on its length 730 feet, which has ore containing 10% copper and \$6 gold. He expects to install an electric plant and a 200-ton matting furnace at Saltese in the spring.

PARK COUNTY.

Jardine says the Bear Gulch M. Co. has settled its litigation and negotiations are pending for a consolidation with the Gold King Co. and a sale to Chicago men. The ledges of the Bear Gulch have been opened to a depth of 1000 feet, and are wide, carrying an average value of \$15 per ton. Work is being pushed at the Yellowstone and the Crevasse in the same district.

The Revenue 40-stamp mill at Jardine is being altered. All of the vanners and concentrators are being taken out and extra plates substituted. The tailings will be saved and treated by the cyanide process.

SILVER BOW COUNTY.

The Travona mine, at Butte, has resumed, and will have the hoisting plant from the Mayflower, in Jefferson county.

Butte says Receiver W. E. Carroll, in the Nipper mining case, filed his report. He finds a number of discrepancies between the figures of Receiver Harris and the Montana Ore Purchasing Co., and that there is due the receivership from the Montana Ore Purchasing Co. the sum of \$15,502.77.

The tailings of the abandoned Parrot smelter, Butte, which were successfully worked over in a concentrator for some time, are being shipped for treatment to the Colorado smelter.

NEVADA.

ESMERALDA COUNTY.

The Red Mountain G. M. Co., at Silver Peak, has incorporated under the laws of Arizona; \$300,000; A. F. White is manager.

In the Paymaster mine, near Silver Peak, Manager J. L. Butler has opened up a 7-foot ledge of ore assaying \$10 a ton in gold.

HUMBOLDT COUNTY.

The Spring valley placers will be worked by hydraulicking.

The California-Nevada M. Co. has eight men at work on the Arizona mine at Unionville taking ore for trial shipment.

LINCOLN COUNTY.

The Manhattan M. Co. at Stampede Gap, near Pioche, are putting in a whim, also air pipes.

LYON COUNTY.

The Journal says work has been suspended in the North Rapidan tunnel at Como for lack of fuel to run the steam boilers, due to the condition of the wagon road to Dayton.

NYE COUNTY.

A new strike is reported on the 400 level of the Mizpah mine at Tonopah.

Sinking of the new shaft of the Montana-Tonopah continues at the rate of 5 feet per day, a depth of 300 feet having been reached. At the 400 a crosscut will be run in the porphyry lode to open the ledge.

President J. M. Burke of the Tonopah Extension M. Co., at Butler, says he will put in machinery to sink the shaft on the Grand Trunk claim to 1000 feet.

The Tonopah M. Co. is taking out ore from the 400-foot level of the Mizpah. It is proposed to build their own reduction works, says the Miner.

The Gold Hill Co. has installed a steam hoist and has resumed sinking.

The winze on the 230 level of the Ray & O'Brien is in an 18-inch shoot of ore averaging \$150 a ton. The drift on the 160 level is in 110 feet from the shaft, and an upraise is being driven into two shoots of ore.

Copper pyrites are found in the ledge at the bottom of the 250-foot incline shaft on the Silver Knight mine at Klundike, says the Bonanza. The country rocks are lime and quartzite, with a formation of shale lying between, the trend northeast and southwest.

At Butler development work in the group of mines of the Tonopah M. Co. is being pushed; the drifts on the Mizpah vein, 300-foot level, are in ore, the east drift is nearing the east end line of the Mizpah claim; the 400-foot level is being opened up by drifts east and west. There is no cropping on the surface on the east

end of the Mizpah claim as the ledges have been capped by a later flow of porphyry.

The south crosscut on the 240-foot level of the Valley View shaft cut a 9-foot vein recently and is expected to cut the main ledges of the Valley View claim. The stone foundation for the steel hoist and machinery building is completed.

The Bonanza says G. F. Hensel of Philadelphia has bought the Molly M. Co.'s claims and also the Tonopah Fraction Extension. The Tonopah T. & M. Co., the Tonopah Belmont M. Co. and the Acenth M. Co. have consolidated as the Tonopah Belmont Dev. Co., and bought the rights of the G. & H. tunnel, which operates through Mt. Oddie.

WASHOE COUNTY.

A. F. Sisson reports ore running \$25 per ton at the Belcher, at Olinghouse.

The No. 2 mine at Olinghouse is in low-grade ore on the south drift, 80-foot level. Superintendent Poole says the entire drift is in ore.

The Wadsworth Dispatch says that the Crown Point mine, under bond to Bell & Co., has been released. The last shots fired brought ore in both north and south drifts.

NEW MEXICO.

GRANT COUNTY.

Negotiations are under way for the erection of a smelter, with a capacity of 100 tons, at Silver City. No attempt will be made to utilize the plant which is now standing idle. The projectors have extensive interests in the county.

Manager L. P. Deming of the Alessandro C. Co., near Silver City, says he will put in a leaching plant for the treatment of the ore. The company owns the Jones and Gettysburg groups of twenty-two mining claims in the Burro Mt. district. The American C. Co. also intends to install a leaching plant.

LINCOLN COUNTY.

Nogal says the White Mountain G. M. & M. Co. is developing the Star Gem group in Cliff canyon. A 200-ton cyanide plant will be put up.

SANTA FE COUNTY.

The St. Lazarus mine, near San Pedro, has been sold under foreclosure of mechanics' liens.

The smelter at Cerrillos is treating copper ores exclusively, but it is the intention of the company to build the most complete plant for separating zinc and lead that can be obtained. The ores of the Cerrillos district contain equal parts of lead and zinc with silver. W. A. Brown of Franklin, Pa., who is financially interested in the smelter, is giving his personal attention to its operation.

OREGON.

BAKER COUNTY.

The management of the Blue Bird, at Red Boy, has changed its original plans. Owing to the good showing recently made in the crosscut in opening the third vein on the property, it is thought wise to defer the erection of a stamp mill until a later date. The ore body is of such dimensions as to justify a larger plant to handle the ore, and work is now in progress on a compressor plant. The preliminary work is being done. The plant will consist of a 6 drill compressor, 70 H. P. holler and large engine, with power drills. Work will at once begin on the necessary buildings to accommodate this machinery.

W. R. Crawford has bought a three-fourths interest in the Phoenix mine, near Baker City, for \$30,000.

GRANT COUNTY.

Near Granite the Bonanza Co. will sink another 200 feet to the 1000-foot level, and stopping on the upper levels will begin. A 10-stamp mill is being erected at the Virginia, in the Greenhorn district.

JACKSON COUNTY.

The Homestake mine, near Woodville, has been bonded to Eastern men for \$8000.

JOSEPHINE COUNTY.

The placers of the Waldo district have resumed. The Simmons mine has enlarged its plant. These mines get water from the Illinois river, which heads on the north slope of the Siskiyou. In Grave Creek district the giants have been turned on. Several of these placers have had extensive repairs and more pay dirt will be moved this season than ever before.

Grants Pass says the recently equipped Eureka mine of the Soldier Creek district has ore giving \$15 per ton free on the plates, sulphurets \$10 per ton. A 10-stamp mill is on the property. A wagon road is to be built from the main county road and a telephone line to connect with the Sunset Co.

MALHEUR COUNTY.

Superintendent R. M. Wilson, Red, White & Blue M. Co., says he will replace the present mill with six 1200-pound stamps.

SOUTH DAKOTA.

LAWRENCE COUNTY.

The Penobscot G. M. Co. is building a 40-stamp mill, provision being made that more stamps may be put in when desired. The first forty stamps will be started early in December and the work of adding ten stamps begun. There is room in the building for eighty stamps.

The report of State Mine Inspector T. Gregory for the first ten months of 1902 shows that during that time the Homestake mills crushed 1,218,069 tons of ore, which produced a gold value of \$4,303,977.57—equal to \$3.53 per ton.

The Spearfish G. M. Co. has made a discovery in relation to the ore bodies in the south end of the property. There is a second ore formation lying underneath the main blanket vein, separated from it by lime formation. In a tunnel on ore outcropping in Johnson gulch it was proved that the vein dipped into the hill and in following up this showing it was found that another ore body has been disclosed, which is 18 feet below the main vein.

The Pluma Co. at Lead is excavating at the Hawkeye mill for enlarging from forty to eighty stamps. The west cross-drift on the 300 level of the mine is developing ore.

The new cyanide mill of the Hidden Fortune Co. at Central, of sixty stamps, will be completed by January 1.

Forty stamps and a cyanide mill will be added to the Pluma G. M. Co.'s plant at Pluma.

A new shoot of ore has been discovered by the University G. M. Co., near Deadwood, in the South Dakota ground on Annie creek. Part of the body is an oxidized ore, adapted to cyaniding, the rest of it is a smelting ore.

PENNINGTON COUNTY.

The mining village of Rochford, 18 miles south of Deadwood, was completely destroyed by fire on the night of Nov. 28.

UTAH.

BEAVER COUNTY.

The Beaver Con. M. Co., near Milford, is putting in a 75 H. P. hoist and an air compressor.

The working tunnel on the old Hickory, at Milford, is in copper ore 158 feet from the mouth and a vertical depth of 80 feet. The ore has red and black oxides and sulphides. Foreman Price has twenty-one men at work and is enlarging the shaft to a double-compartment, and as soon as this is completed will resume sinking.

At Milford thirty-five men are at work on the Majestic smelter. The masonry is about done.

The returns to the Horn Silver mine of Frisco from a shipment to the smelter show 21.5% copper, 20% lead, six ounces silver and 60 cents gold per ton.

JUAB COUNTY.

Having found a market for its argentiferous iron ores at the furnaces of the Bingham Con. smelter, the management of the Swansea of Tintic has begun shipments, the contract with the smelter enabling it to ship 2000 tons per month. Of this class of ore the management reports 4000 tons in the bins, and steady shipments are assured pending the resumption of work underground.

At a depth of 1600 feet the Gemini M. Co. at Tintic has ore showing 3% copper, in addition to increase in gold values.

Manager J. W. McChrystal of the Eagle & Blue Bell at Tintic says that at the bottom of the winze, 400 feet below the 230-foot level, a vertical depth of 1250 feet below the surface, breast samples show \$60 in gold and 25% copper.

The Little Chief, Eureka, has levied an assessment of 1 cent per share.

The Utah mine at Fish Springs has declared a dividend of 2 cents a share, or \$2000.

SALT LAKE COUNTY.

At Bingham Superintendent W. J. Craig of the Tintic M. & D. Co. says he has cut the vein in the Yampa at 2300 feet in the lower tunnel. The vein is 25 feet between walls and assays \$5.60 gold, 4% copper and a few ounces silver. To connect with the workings above there is 1000 feet of ore through which to raise. A smelter is proposed.

Salt Lake reports that the tunnel being driven to drain the Dalton & Lark has tapped the water in the old workings.

Salt Lake says the annual report of the Dexter-Tuscarora by G. E. Airis, secretary, shows a gross yield during the year of \$130,000, profit of \$23,000, derived from 30,090 tons of ore at \$7.12½ per ton. An extraction of \$4.77½ was made at a cost of \$4.59 for mining, milling and development work.

The Dewey mill, Bingham Canyon, is handling ores of the Sampson M. Co. and has returned the fourth lot of concentrates. The tonnage is increasing so that

an addition will be made to the mill in the spring.

SEVIER COUNTY.

Richfield reports a strike in the B. W. & H. claims in the Gold Mountain district at a point 267 feet above tunnel No. 2, and it seems to be the principal vein. Superintendent J. Billingsly is driving a crosscut to find its width.

SUMMIT COUNTY.

Near Park City, the Scottish Chief M. Co. has bought the Insley Co.'s claims, installed a gasoline hoist, and are down 150 feet in the shaft. Fifteen men are at work.

The plant of the Mackintosh sampler at Park City is in operation, and has a capacity of fifty tons per hour.

Park City says Loring Bros. have closed down their concentrator for the winter. Electrical machinery is being installed at the zinc plant.

A strike is reported at the Nalldriver, near Park City, made by the graders while excavating for the boarding house, and consists of a vein of carbonate ore 1 foot in width. The ore returned fifty ounces of silver per ton from the surface.

Superintendent McSorley of the Daly-Judge reports the management has been opening its Bonanza ground in ore for days, no effort being made to stop, and that for forty-eight hours but a single mine car of waste was run out. Some of this ore carries 60% lead, with fifty ounces silver.

TOOELE COUNTY.

Metallurgist Colbeth, Con. Mercur M. Co., returned from the testing of a car of Con. Mercur ore by the Pohle-Crossdale Co. of Denver, says of the tests: The Pohle-Crossdale volatilization process consists in a chloridizing roast and then bringing the ore to such a degree of heat that chlorides are volatilized. The recovery apparatus is an expansion chamber and gravel tower where the fumes are cooled; this chamber varying according to the amount of salt used and of fumes to expand; built of brick and lined with glazed tiling to prevent absorption by the bricks. The fumes pass from upper end of chamber through horizontal iron pipes (common boiler stacks used) to bottom of gravel tower; fumes have no action on iron pipe while kept warm and dry. The gravel tower has a 4-inch layer of coarse gravel, with spray of water on it; water drawn off through filter and gold or silver chloride and lead sulphates partly recovered; gravel is used to break up bubbles of gas. From gravel tower fumes pass through gas exhaust pan into filter tower, through four burlap filters, each a spray of water on it, then fumes pass up stack and out; water from sprays on hurlaps passes through same process as from gravel tower.

WASHINGTON COUNTY.

Manager G. Snyder of the Dixie mines, near St. George, is placing the machinery for the smelter.—At the Paymaster, prospected under an \$80,000 option by A. J. Mallory et al., drifting is in progress from two levels in the shaft.

WASHINGTON.

COWLITZ COUNTY.

The Arnold M. & M. Co. of Kalama is incorporated; \$1,000,000; F. W. and S. Arnold, H. M. Stevens, G. Gassin. A shaft will be sunk on the company's ledge, 1500 feet north of the Darnell mine.

FERRY COUNTY.

Near Republic Superintendent Angus at the Quip is sinking from the 400-foot level. A crosscut is being driven from the bottom of the shaft to intersect the vein. Thirty-two men are at work.

The Pioneer-Miner says the Republic Placer Co. has bought the Falls and Little Falls claims on Granite creek.

S. P. Damer, general manager at Republic of the Ben Hur G. M. Co., reports that the Ben Hur will work through the Trade Dollar shaft and its 200 and 300 levels. The Trade Dollar will be unwatered by Superintendent G. N. Miller. The Ben Hur takes possession of Trade Dollar machinery and workings. The term of the agreement is one year. The Trade Dollar Co. drove the south drift to the boundary of the Ben Hur, the last 19 feet being on a payshoot which strikes into the Ben Hur. On the 300 level the payshoot is 19 feet from the end line.

Superintendent Angus says since work was resumed on the Quip, at Republic, in October, 1300 tons of ore have been shipped to the smelter, having an average value of \$23 per ton. At present no stopping is being done beyond breaking ore in the winze and in upraising to make connections between the levels. Five levels have been opened, the fourth level showing 125 linear feet of the pay shoot. An 8 H. P. engine will be installed on the fourth level to hoist out of the winze that is being sunk on the pay shoot.

SNOHOMISH COUNTY.

The Libbey tunnel, near Index, is in 160 feet, the last 20 feet in ore 4½ feet wide,

showing chalcopryrite and arsenopyrite. J. Carignan and J. Spada are the owners.

SPOKANE COUNTY.

The old Spokane smelter has been revived and is in the hands of a new company, which proposes to commence business as soon as their plans for the remodeling of the plant are complete. Mr. Van Ossel, metallurgist of the company, was through the Kootenays recently with a view to looking over the country and conducting preliminary arrangements for the purchase of British Columbia lead ores.

THURSTON COUNTY.

President H. G. Longee of the Great Western C. D. & M. Co. says they have 2000 acres of coal lands near Tenino. There are four flat veins aggregating 20 feet thick, but as yet only the top seam of 4 feet is being stoped. Aspur will be built from the property 2½ miles to connect with the N. P. and the Port Townsend & Southern railroads, giving a haul of 15 miles to Olympia. Two bunkers have been erected at the mine.

WYOMING.

CARBON COUNTY.

M. M. Green, part owner of the Rambler mine, was in Saratoga a few days ago to arrange for enlargement of the Rambler smelter fifty tons daily capacity. The capacity of the plant at present is 100 tons.

SHERIDAN COUNTY.

The Galena Ridge M. Co., with the following officers, has been organized at Lead City, S. D.: T. J. Grier, president; E. May, vice-president; C. Kellar, secretary; R. H. Driscoll, treasurer; H. Schnitzel, superintendent; C. W. Merrill, consulting engineer; G. W. Holdredge, B. Moody. The company will operate in the Big Horn country.

FOREIGN.

BRITISH COLUMBIA.

The Tacoma Smelter Co. has sued the Lenora M. Co. of Vancouver island for \$25,000 for breach of contract, alleging failure to furnish a stated amount of ore. At the solicitation of other creditors, Judge Drake at Victoria has appointed a liquidator who will take charge of the property in the interest of creditors.

Manager T. Kiddie, Tyee smelter at Ladysmith, is installing the boilers and machinery for the plant, and expects to blow in this month. The aerial tramway from the Tyee mine to Westholme is moving ore for the sampling works and roast heaps, so that when the smelter starts there will be material to work on.

Manager J. H. Mackenzie, Le Rol mine, and Northport smelter, says the cost of smelting at Northport averaged for November, with three furnaces running, about \$3.50 a ton. During October the cost was \$3.89 a ton, with coke \$9.25 a ton. Now they are getting coke from Crow's Nest fields, at \$7.75 a ton. A fourth furnace will be installed, which will reduce the cost to \$3 a ton. The practice of using calcining furnaces to bring up the grade of matte has been resumed, making a matte running 48% in copper and slag losses less than formerly. The average of the matte was 40% and was run through blast furnaces two or three times, with a loss of copper in slag each time. The charge of limerock, formerly 41%, is now 27%.

Rosland says the Cariboo-McKinney M. Co., of Camp McKinney, has declared a dividend of 2½ cents a share, payable December 15.

Manager Kirby's annual report of the Centre Star M. Co., near Rosland, shows ore sales during the year 11,086 tons, averaging gross values \$16.24 and gross smelter values \$13.31. Cost of development \$172,552; diamond drilling \$8571.27. Ore contents averaged gold .64 ounce, silver .56 ounce, copper 1.2%. The development work for the year was as follows: Main shaft, 362 feet, cost per foot \$95.15; winzes, 50.5 feet at \$45.22 per foot; raises, 153 feet at \$33.21 per foot; drifting, 3997.5 feet at \$21.93 per foot; a total of 4563 feet development for the year. The cost of stoping was \$2.93 per ton. A mill and concentrator will be erected.

The British Columbia Government has issued a report on the mining situation which shows a promising outlook in the mines of that district. The estimated general output of that province has increased from 20% to 25% over that of last year.

At Fife, on Christiana lake, the Trill smelter has leased the lime quarries of T. Price for ten years.

At the Snowshoe mine, near Phoenix, work is being pushed on the new gallows-frame, and the ore bins, which will have a capacity of 3000 tons—75 feet long, 52 feet high, 20 feet wide; seventy men are at work, and 150 tons of ore daily are shipped to the smelter.

Fort Steele says the Kootenay Placer M. Co., on Perry creek, expect to have their dredger in operation next week. The

placer mines on Wild Horse creek have finished their cleanup. The yield exceeds that of 1901.

The Ladysmith smelter at Vancouver Island will be blown in next week.

Near Ferguson, Manager E. G. Haddow, Great Western M. Co., has forty men at the Nettie L. The Silver Cup has thirty men at work.

Lardeau's mining record office has been removed to Camborne.

Five tons of Hampton ore from the Slocan returned 1883 ounces of silver to the tons at the smelter.

The Le Rol made a profit of \$68,617 for November and cleared \$417,686 for the last five months.

The 100 H. P. dynamo, which will be used to drive the ore crusher at the Knob Hill mine, is being set up. The 700 H. P. dynamo, to drive the air compressor, will arrive next month.

Phoenix says ore shipments from the mines of the Boundary last week were: Granby mines, 4620 tons; Snowshoe, 1410; Mother Lode, 4320; B. C., 660; Sunset, 500; Emma, 690; total for the week, 12,200; total for the year to date, 445,655.

Grand Forks says Republic ore shipments to the smelter last week were as follows: Qulp, 322 tons; Morning Glory, 31; Lone Pine-Surprise, 118; total to date, 2966 tons.

Slaking is resumed at the White Bear mine near Rosland. Drifts will be run at the 900 to open up ore crosscut on the 700.

The owners of the Providence mine, near Greenwood, have received \$2887, net proceeds of a car of ore containing 40,910 pounds gross shipped to the Trail smelter. This gives \$130 per ton, net.

A smelter is projected at Golden by the Laborers' Co-operative G. S. & C. M. Co. of British Columbia. While it is designed to handle the ores mined by the company, custom ores will also be treated.

The Cork mine, near Kaslo, will ship ore; 1200 feet of crosscutting is being done and water power developed preparatory to building an electric plant.

The Fog Horn mine, in Ymir district, owned by the Golden Monarch Co. of Spokane, Wash., will ship 500 tons of ore which will average about \$25. The road from Ymir to the mine is completed, and as soon as the snow is deep enough shipments will begin. It is the intention of the company to erect a concentrator, compressor plant and aerial tramway in the spring.

Sandon says the electric drills at the Payne have been discarded. The Ophir-Lode Syndicate will install a 10-stamp mill on their Lardeau property.

The Highland mine at Ainsworth is shipping concentrates. B. Cortiana has a lease on the property.

The Nickel Plate mine, Similkameen district, is erecting a 40-stamp mill, and when railway connections are secured will put up a smelter.

The New Fairview M. Co., at Fairview, intend to sink the shaft 100 feet deeper. The cyanide plant will be in operation this month. The main tanks are 36 feet in diameter, 10 feet deep and will hold 200 tons of tallings.

Sandon says the Bayonne mine at the head of Summit creek has been bonded to B. N. White for \$50,000, the first payment \$5000. A trail has been built in from the landing on the Kootenay river to the group by the government.

A bessemerizing plant will be added to the British Columbia C. M. Co.'s Greenwood smelter.

Placer fields have been discovered on the fork of the Salmon river, near Erie, 30 miles south of Nelson.

The power line of the Cascade Power Co., near Grand Forks, is in operation.

The Miners says C. W. Mortimer, British Vice-Consul at Los Angeles, Cal., has bought ten acres of land ½ mile south of Grand Forks, and will install a drilling plant to bore for oil.

In the Ottawa, No. 3 drift is in the ore body 70 feet. Two carloads of ore have been taken out in drifting, no stoping being done; 800 sacks await shipping; of this amount 100 tons is high grade, which will return 500 ounces silver; the remainder is the general filling of the ore shoot and will run 100 ounces.

In the Meteor the vein has been found in the lower crosscut. The ore body is 6 inches wide. The lessees will commence stoping and make a shipment.

The pay streak on the Legal, on the North Fork of Lemon creek, has been struck in the lower tunnel. The pay is 10 inches wide and assays \$64 gold. Work will be suspended until next summer, when cars and track will be put in.

The owners of the Vancouver group, in Aspen Grove, Similkameen country, have opened a large body of copper. The pay is 40 feet in width and extends through the group. Recently samples from an 18-inch seam assayed 2.20 ounces silver, \$2.80 gold and 55.04% copper; and 1.90 ounce silver, \$2.32 gold and 18.04% copper. A sample from the remaining portion of the full width of the pay streak

gave 5.20 ounces silver, \$1.60 gold and 6.03% copper.

Recently an adjoining group was sold to Indianapolis people for \$100,000, and the Sovereign group, on the same hill, was sold to Indianapolis capitalists for \$75,000.

KLONDIKE.

Dawson says a flow of water from a mine shaft on El Dorado creek has caused concern. Miners have been sinking the shaft through several layers of gold-bearing sand and loose rock, expecting to get to bedrock. When down 210 feet water rose in the shaft, filling it in six hours, then overflowed and run through Bonanza Camp, damaging mining machinery and small buildings. The stream contained 500 miners' inches and carried white sand out with it. Beaudette, the Government engineer, will try to control the flow.

Personal.

J. L. HARRIS is superintendent Quincy, Houghton, Mich.

F. G. ROSE is manager the Duke M. Co., Montpelier, Idaho.

J. EVANS is superintendent of the New Home M. Co., Leadville, Colo.

J. G. KEPPLER has returned to Kingman, Ariz., from Nacozari, Mexico.

W. L. VINSON, manager Emma mine, Virtue district, Oregon, is in the East.

W. C. HOWARD, owner of mines at Hayden Hill, Cal., is in San Francisco, Cal.

W. H. GENDER is superintendent of the Trilune mine and tram, Ferguson, B. C.

JOHN PARR, a mining operator of Bodie, Cal., is inspecting mines at Tonopah, Nev.

H. H. HUNTER of Salt Lake City, Utah, is examining mining property near Elko, Nev.

F. W. HARTMAN is chief mining engineer of the Wolverine, Houghton, Mich.

I. S. WEAVER of Baltimore, Md., is superintendent Oswego mine at Hailey, Idaho.

A. M. STRODE is manager of the Stevens Peak Copper M. Co., near Mullan, Idaho.

GEO. A. PACKARD of Boston has made a report on the Monte gold mine, Baker City, Or.

F. LINSOTT is superintendent of the New York mine, Greenville, Plumas county, Cal.

CHAS. HUFF is manager the Calbre Copper Co., Montpelier, Idaho, vice F. G. Rose, resigned.

JOHN EVANS has been appointed superintendent of the New Home M. Co., at Leadville, Colo.

L. E. BOYER succeeds P. Creasor as superintendent of the Lone Pine mine, Republic, Wash.

C. O. BARNES is manager for the Curlew and the Trade Dollar G. M. Co.'s at Republic, Wash.

R. B. TURNER, superintendent of the Kennett mines at Virginia, Mont., is in Butte City, Mont.

PRESIDENT D. KEITH of the Silver King, has returned to Park City, Utah, from Portland, Or.

ABBOT A. HANKS of San Francisco has returned from examining mining property near Tonopah, Nev.

W. M. NESBIT has returned to Tintic, Utah, from an examination of mining property in Colorado.

T. S. HUDDLESTON, superintendent of the Galena King mine at Stockton, Utah, is in Salt Lake, Utah.

MANAGER W. M. BROOK, Con. Spruce Creek Placer Co., Ltd., Atlin, B. C., has returned from Vancouver.

C. L. HANSEN AND A. S. PARKER of Los Angeles, of the Tonopah & California M. Co., are at Tonopah, Nev.

L. P. DEMING has returned to Silver City, N. M., from a trip East on business for the Alessandro Copper Co.

W. L. SAUNDERS, vice-president of the Ingersoll-Sargeant Drill Co. of New York, was in Butte, Mont., last week.

J. M. BURKE, president of the Tonopah Extension M. Co., Butler, Nev., is in San Francisco on company business.

MANAGER C. O'KEEFE of the Sonora M. & M. Co., Phoenix, Ariz., has gone to New York on company business.

MANAGER M. R. HUNT has been making an examination of the Bingham & Eastern Co.'s property at Bingham.

G. A. NIELL is superintendent of the

New Independence mine, near Nevada City, Cal., vice C. M. Root, resigned.

MANAGER C. I. RADER of the Annie Laurie, near Salt Lake, is in Chicago, attending a meeting of shareholders.

MANAGER T. S. IRVIN, the American mine, French Gulch, Shasta county, Cal., has returned from San Francisco, Cal.

SUPERINTENDENT W. J. BELCHER, the White Bear mine, Downsville, Cal., has returned from San Francisco, Cal.

E. S. McDOWALL, mine and mill accountant, formerly at De Lamar, Nev., is with the Majestic Co., at Milford, Utah.

SUPERINTENDENT C. H. DUNTON of the Eureka slate quarry at Kelsey, Cal., has returned from a five weeks' visit East.

F. B. JOHNSON, former manager of the Stratton mining interests in Cripple Creek, has returned to Georgetown, Colo.

SUPERINTENDENT R. M. WILSON of the Red, White and Blue mine, Malheur City, Or., has returned from San Francisco.

MANAGER N. TREWEEK of the Big Cottonwood C. & G. Co., Park City, Utah, has gone East on business for the company.

A. DIBBLE, superintendent of the Daniel Webster quartz mine, near Michigan Bluff, Cal., has returned there from San Francisco, Cal.

W. F. SNYDER, president and manager Western Exploration Co., Salt Lake City, Utah, has gone to California to inspect mining properties.

A. J. DORAN of Kingman, Ariz., is making an examination of the Walters mine and mill, on the Santa Maria river, Yavapai county, Ariz.

W. R. THOMAS, superintendent of the Central Eureka mine, Sutter Creek, Cal., is at Berkeley, Cal., where he is recovering from a severe illness.

B. B. THAYER, superintendent for the Santa Rita M. Co. of Santa Rita, N. M., has gone to New York City on business, to be absent three weeks.

W. E. DOWNS, C. E., of Sutter Creek, Cal., is in San Francisco, Cal., on business. Mr. Downs is engineer for several mining companies in Amador county.

MANAGER J. H. MACKENZIE of the Le Rol, B. C., mine and Northport, Wash., smelter, has returned to Northport from a business trip to Spokane, Wash.

P. E. MURRAY, superintendent Zubiata mine, Sonora, Mexico, who had been in San Francisco, Cal., purchasing machinery for his company, has returned to the mine.

VICE-PRESIDENT O. J. FARNSWORTH AND MANAGER J. C. LOSS of the Bonanza G. M. & S. Co. of Leavenworth, Kan., are at the company's works near Casa Grande, Ariz.

W. H. LINNEY has resigned the superintendency of the De Lamar, Nev., mines, being succeeded by F. A. Keith, and F. P. Janney has been appointed general superintendent. D. L. Davis assumes the position of engineer, succeeding Mr. Keith.

C. M. BELSHAW, president of the California Miners' Association, announces the following committees for the ensuing year: Executive Committee at Large—J. H. Neff, chairman; E. C. Voorhies, W. C. Ralston, Harold T. Power, John F. Davis, A. Caminetti, Tiley L. Ford, W. W. Montague, Charles G. Yale, Edward Coleman, Andrew Carrigan, Mark B. Kerr, J. S. McBride, J. J. Crawford, B. N. Shoecraft, C. C. Bush, Dr. C. T. Deane, David McClure Jr., J. W. C. Maxwell, E. A. Belcher, J. F. Halloran, John McMurry, W. S. Keyes, W. H. McClintock, Dan T. Cole, George H. Wallis, F. F. Thomas, Frank R. Wehe, Julian Sonntag, Fred Bradley, W. P. Hammon, J. O. Harron, John M. Wright. County Executive Committee—Alameda, Professor S. B. Christy, Frank A. Leach; Amador, J. F. Parks, J. B. Tregloan; Butte, A. Ekman, Frank Griffin; Calaveras, A. I. McSorley, F. J. Solinsky; El Dorado, Thomas Clark, H. E. Pickett; Fresno, A. R. Briggs, W. H. McKenzle; Kern, John Treadwell, B. F. Brooks; Mariposa, C. C. Derby, A. H. Ward; Mono, R. T. Pierce, R. H. Turner; Nevada, A. D. Foote, W. F. Englebright; Northern California, Lewis T. Wright, H. W. Turner, W. I. Hupp Jr.; Placer, William Nichols Jr., W. S. Graham; Plumas, George Standart, U. S. Webb; Sacramento, J. H. Batcher, A. C. Hinkson; Santa Clara, Eillard W. Carson; Thomas Derby; San Francisco, Louis Glass, Arthur C. Bates; Shasta, Fred Hurst, W. J. Gillespie; Sierra, W. I. Redding, George F. Taylor; Southern California, H. Z. Osborne, Theodore B. Comstock, F. W. Braun; Tuolumne, Fred Sutton, A. C. Morrison; Yuba, W. B. Meek, F. K. Lord; Sonoma,

C. A. Grimmer, Alfred Abbey. Committee on Finance—Andrew Carrigan, chairman; Joseph Sloss, J. O. Harron. Committee on Legislation—John F. Davis, chairman; W. B. Lardner, J. R. Tyrrell, W. C. Ralston, F. S. Moody, A. E. Muenster, R. C. Rust. Committee on Mineral Lands and Conservation of Water—E. C. Voorhies, chairman; Marion DeVries, A. D. Foote, H. E. Pickett, B. S. Reector. Committee on Department of Mines and Mining—W. C. Ralston, R. G. Lukens, Threy L. Ford, C. H. Dunton.

Commercial Paragraphs.

FAIRBANKS, MORSE & CO., Denver, Colo., have received orders for one 34 H. P. gasoline hoist for California, two 34 H. P. and three 22 H. P. gasoline hoists for Clear Creek and Gilpin counties, Colo.

THE Paraffine Paint Co. of San Francisco, Cal., is getting ready to vacate its old quarters at 116 Battery St., to occupy its fine new building on Second St., which will afford better facilities for its increasing business.

THE H. E. Skinner Co., San Francisco, Cal., dealers in firearms, ammunition, sporting goods, etc., have removed to the Flood building, No. 801 Market street, San Francisco, Cal., corner of Fourth, with a large stock of their special lines.

THE American Steel & Wire Co. has for some months been building bigger and better quarters at the newly acquired site, Folsom and Sixteenth streets, San Francisco, Cal., and has moved the general offices there from the old Pine street location.

THE old and well-known firm of Jno. Taylor & Co., San Francisco, Cal., dealers in assayers' supplies, chemicals, etc., which was established in 1849, has been absorbed by the enterprising firm of F. W. Braun & Co. of Los Angeles, Cal., who will take possession of their new acquisition Jan. 1, 1903.

THE district office managers of the Westinghouse Electric & Mfg. Co., representing all the principal cities of the United States, have spent the past week in their usual annual visit to the works and offices of that company at East Pittsburgh. On the evening of November 19 a very enjoyable dinner in honor of the visitors was given at the Duquesne Club, at which the engineers and executive officers of the company were also present.

Catalogues Received.

"Concentration Mills and Machinery" is the subject of Catalogue No. 7-B of the Colorado Iron Works Co., Denver, Colo., elaborately illustrating and describing some of that company's specialties, improved standard rolls, impact screens, Bartlett concentrators, hydraulic classifiers, etc.

Obituary.

W. C. REYNOLDS, mining engineer, employed by Marshall Field and the Pullman Co., died in San Francisco, Cal., Nov. 27.

New Patents.

DEWEY, STRONG & CO.'S SCIENTIFIC PRESS PATENT AGENCY, 330 Market St., S. F., has official reports of the following U. S. patents issued to Pacific coast inventors:

- FOR THE WEEK ENDING NOVEMBER 25, 1902.
- 714,631.—**AIR BRAKES**—E. M. Barnes, Sacramento, Cal.
- 714,357.—**CONVEYER**—H. W. Blaisdell, Yuma, Ariz.
- 714,633.—**DINNER PAIL**—J. T. Bluff, Seattle, Wash.
- 714,273.—**CONVEYER**—M. Bradfield, Los Angeles, Cal.
- 714,278.—**CONVEYER**—M. Bradfield, Los Angeles, Cal.
- 714,140.—**HAND TRUCK**—E. J. Bryan, Riverside, Cal.
- 714,449.—**CONVEYER**—G. C. Carson, Redding, Cal.
- 714,450.—**TREATING METAL**—G. C. Carson, Redding, Cal.
- 714,451.—**CONVEYER**—G. C. Carson, Redding, Cal.
- 714,287.—**HOD**—J. Dorey, Seattle, Wash.
- 714,467.—**OIL BURNER**—M. A. Fesier, Visalia, Cal.
- 714,180.—**ENGINE**—C. Hendricks, Riverside, Cal.
- 714,374.—**MOP WRINGER**—W. W. M. Hickey, S. F.
- 714,375.—**BED COUCH**—J. Hoey, S. F.
- 714,307.—**SUSPENDERS**—A. N. Johnson, Seattle, Wash.
- 714,373.—**ROTARY HARROW**—H. F. Jurs, Benicia, Cal.
- 714,585.—**FAUCET**—A. J. Ketelsen, Seattle, Wash.
- 714,587.—**COIN APPARATUS**—G. F. Lehrke, S. F.
- 714,203.—**GRAIN ELEVATOR**—Levy & Anderson, Liberty, Ariz.
- 714,385.—**BAG MACHINE**—J. V. Matteson, S. F.
- 714,316.—**MUSIC CHART**—C. T. Meredith, San Diego, Cal.
- 714,394.—**OIL BURNER**—Pfeiffer & Staples, S. F.
- 714,337.—**OILER**—G. W. Thurston, Kern, Cal.
- 714,539.—**SEALING JARS**—W. Walter, Shelton, Wash.
- 714,339.—**STILL**—Warren & Healy, Fort Thomas, Ariz.
- 714,416.—**PUMP**—A. W. Weaver, El Verano, Cal.

Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

MOP WRINGERS.—No. 714,374. Nov. 25, 1902. W. W. M. Hickey, San Francisco, Cal. The object of this invention is to provide a simple labor-saving device for wringing the mop cloth. It consists of a handle having suitable clamps means to engage the ends of the folded mop cloth, a sleeve slidable on the handle, means for locking the sleeve thereon, a hovel gear loosely turnable on said sleeve, a rectangular frame carried by said hovel gear and having its end enclosed by the cloth, and means upon the sleeve by which the cloth gear and frame may be rotated about the handle as an axis.

OIL BURNER.—No. 714,394. Nov. 25, 1902. L. A. Pfeiffer and L. D. Staples, San Francisco, Cal. The object of this invention is to construct an apparatus for the burning of hydrocarbon oils, and preferably for crude or unrefined oil, by the use of concentric tubes, into the inner one of which the oil is admitted and into the outer surround one of which steam is admitted, so as to heat the oil and to retain the steam under boiler pressure in the chamber which encloses the one through which the oil flows, and also to mix the steam and oil at this high temperature, and deliver the two eventually through the burner nozzle. Within the inner tube is a longitudinal movable rod having a valve at its front end which controls the discharge of oil, while said inner tube is in itself movable and has its front end so formed as to control the discharge of the steam into the mixing chamber, where it unites with the oil.

BEN COUCH.—No. 714,375. Nov. 25, 1902. John Hory, San Francisco, Cal. This invention is designed as an improvement on that class of couches having a hollow box or base adapted to contain bed clothing and the like, a seat frame hinged to the rear portion of the base and a back turnable supported from the seat portion having legs and braces for said legs, which, when folded up into the back, serve as a support to hold the back in its upright position. When unfolded, the braces extend the legs so as to support the back in a horizontal position substantially level with the seat portion, both being upholstered. This invention consists in more perfectly hinging the seat and back portion upon the box by hinging the seat portion of the base at a point between the front and rear of the latter and in forming slots and braces connected with the legs so arranged and adapted to operate as to form a strong and immovable support when the couch is opened up.

PUMP.—No. 714,416. Nov. 25, 1902. A. W. Weaver, El Verano, Cal. This invention relates to a novel pump and means for operating the same. It consists of two parallel pistons, piston rods connected therewith and means for operating said pistons consisting of double cam grooves crossing each other and having a switch or intersection, said switch including a movable tongue pivoted in the crossing of the cam grooves and a switch lever connected with the tongue and pivoted at substantially the point where the cam grooves come together. There is a centrally pivoted oscillating arm with the ends of which the piston rods are connected, and an arm extending at right angles from the first named arm and engaging with the groove of the cam; said arm acts to throw the switch at each approach of the crossing points of the cam grooves whereby said grooves are alternately opened to the passage of the arm.

ROTARY HARROW.—No. 714,378. Nov. 25, 1902. H. F. Jurs, Benicia, Cal. Assigned to Baker & Hamilton of San Francisco, Cal., a corporation. The object of this invention is to provide a device which will be much stronger than such harrows ordinarily are, and which will also be simple and economical of construction and which may be operated around trees and vines without injuring the bark of the latter. It consists in the combination of a circular revoluble toothed frame having forked or substantially Y-shaped spokes, a novel means of securing the teeth to the frame, and a projecting cushion on the frame, whereby the metal thereof is prevented from coming in contact with trees and the like.

Latest Market Reports.

SAN FRANCISCO, Dec. 5, 1902.

METALS.

SILVER.—Per oz., Troy: London, 21½d (standard ounce, 925 fine); New York, bar silver, 47½c; refined (1000 fine); San Francisco, 47½c; Mexican dollars, 37c San Francisco, 37½c New York.

COPPER.—New York: Standard, \$10.50@10.75; Lake, 1 to 3 casks, \$11.50; carload lots, \$11.30; Electrolytic, 1 to 3 casks, \$11.37½; carload lots, \$11.25; Casting, 1 to 3 casks, \$11.35; carload lots, \$11.10. San Francisco: \$14.00. Mill copper plates, \$17.00; bars, 18@24c. London: £50 10s 0d spot per ton.

LEAD.—New York, \$4.12½; Salt Lake City, \$3.50; St. Louis, \$4.00; San Francisco \$4.50, carload lots; 4½c 1000 to 4000 lbs.; pipe 5½, sheet 6, bar 5½; pig, \$4.75. London: £10 12s 6d per ton.

SPELTER.—New York, \$5.25; St. Louis, \$4.50; London, £19 17s 6d per ton; San Francisco, ton lots, 6½c; 100-lb lots, 7c.

ANTIMONY.—New York, Cookson's, 93c; Hallett's, 8½c; San Francisco, 1000-lb. lots, 10c; 300 to 500 lbs., 11c; 100-lb. lots, 13@15c.

TIN.—New York, pig, \$24.50; San Francisco, ton lots, 27c; 500 lbs., 27c; 200 lbs., 27½c; less, 28c; bar tin, \$32½c. London, £112 17s 6d spot.

PLATINUM.—San Francisco, crude, \$18.00 @ 30c; New York, ingot, \$19.00 per Troy oz. Platinum ware, 75@80c per gram.

QUICKSILVER.—New York, \$48.00 large lots; London, £8 15s; San Fran-

cisco, local, \$46.00 @ flask of 76½ lbs.; Denver, \$49.50. Export, \$44.50.

BABBITT METAL.—San Francisco, No. 1, 10c; No. 2, 7c; No. 3, 6½c; extra, 17½c; genuine, 35c; Eclipse, 37½c.

ALUMINUM.—New York, No. 1, 90% pure ingots, 35c; No. 2, 90%, 30c to 34c.

SOLDER.—Half-and-half, 100-lb. lots, 18c; San Francisco, Plumbers', 100-lb. lots, 15.10c.

NICKEL.—New York, 50@60c @ ½ lb.; ton lots, 45@48c.

STRUCTURAL MATERIALS.

IRON.—Pittsburg, Bessemer pig, \$24.25; gray forge, \$21.15; San Francisco, bar, 3c @ ½ lb., 3½c in small quantities.

STEEL.—Bessemer billets, Pittsburg, \$30.50 and \$31; open hearth billets, \$32 and \$34.00; San Francisco, bar, 7c to 12c per lb.

CHICAGO CURRENT QUOTATIONS.

Bessemer.....\$25.30@26.00
Foundry Northern 1.....24.50@25.50
Northern 2.....24.00@25.00
Northern 3.....23.50@24.50
Southern 1.....24.65@25.15
Southern 2.....24.00@25.65
Southern 3.....23.65@25.15
Forge.....23.15@24.65
Charcoal.....26.00@27.00
Billets, Bessemer.....33.00@34.00
Bars, iron.....1.85@1.90
Bars, steel.....1.75@1.80
Rails, standard.....28.00@30.00
Rails, light.....34.00@40.00
Plates, boiler.....1.90@2.00
Tank.....1.75@1.80
Sheets, 26 store.....2.95@3.00
No. 27.....3.05@3.10
No. 28.....3.45@3.60
Angles.....1.75@1.80
Beams.....1.75@1.85
Tees.....1.80@2.00
Zees.....1.75@2.25
Cchannels.....1.75@2.25
Steel melting scrap.....19.00@20.00
No. 1 railroad wrought.....20.00@21.00
No. 1 cast, net ton.....17.50@18.00
Iron rails.....24.50@25.50
Car wheels.....21.00@22.00
Cast borings.....10.50@11.00
Turnings.....14.50@14.50

CEMENT.—Germania, \$2.90; K. B. & S., \$3.00; Hewmoor, \$2.90; Trowell, \$2.90; Portland, \$3.25 per bbl.

LIME.—Santa Cruz, \$2.25; Roche Harbor, \$2.25 per bbl.

LUMBER.—(Retail): Pine, ordinary sizes, \$20.00@22.00; extra sizes higher; redwood, \$22.00@23.00; lath, 4 feet, \$4.25 @4.50; pickets, \$19.50; shingles, \$2.35 for No. 1 and \$2.00 for No. 2; shakes, \$13.50 for split and \$14.50 for sawed; rustic, \$26.00 @32.00.

NAILS.—Per keg (list prices): No. 20d to 60d, Wire, \$3.30; Cut, \$3.30; 10d to 16d, Wire, \$3.35; Cut, \$3.35; 8d, Wire, \$3.40; Cut, \$3.40; 6d and 7d, Wire, \$3.50; Cut, \$3.50; 4d and 5d, Wire, \$3.60; Cut, \$3.60; 3d, Wire, \$3.75; Cut, \$3.75; 2d, Wire, \$4.00; Cut, \$4.00. Special rates for carload lots.

GENERAL SUPPLIES.

POWDER.—F. o. b. San Francisco: No. 1, 70% nitro-glycerine, per lb., in carload lots, 15½c; less than one ton, 17½c. No. 1*, 60%, carload lots, 13½c; less than one ton, 15½c. No. 1** 50%, carload lots, 11½c; less than one ton, 13½c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2*, 35%, carload lots, 9c; less than one ton, 11c. No. 2** 30%, carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 725 kegs, \$1.50 per keg; less car lots, \$2 per keg.

CAPS.—3x, \$5.50 per 1000; 4x, \$5.50; 5x, \$8; Lion, \$9, in lots not less than 1000.

FUSE.—Triple tape, \$3.60 per 1000 feet; double tape, \$3.00; single tape, \$2.65; Hemp, \$2.10; Cement No. 2, \$3.00; Cement No. 1, \$2.65, in lots of 3000 feet and up.

CANDLES.—Granite 6s, 16 oz., 40s., 10½c @ set; 14 oz., 40s., 9½c.

COAL.—San Francisco, coast, yard prices: Wellington, \$3.50; Seattle, \$3.50; Coos Bay, \$5.50; Southfield, \$8.00. Cargo lots, Eastern and foreign: Wallend, \$6.50; Brymbo, \$7.50; Pennsylvania, hd., \$14.00; Scotch, \$8; Cumberland, \$12; Canaan, \$9.00; Welsh Anthracite, \$13.00; Rock Springs, \$8.50, long ton; Colorado Anthracite, \$14.00. Coke, \$10.50 per ton in bulk, \$13 in sacks; Sunnyside, \$8.50, long ton.

CHEMICALS.—Cyanide of potassium, 98%-99%, jobbing, 25@26c @ ½ lb.; carloads, 24@24½c; in 10-lb. tins, 35c; sulphuric acid, in carboys, 66½ B, 2c @ ½ lb.; soda ash, \$2.00 @ 100 lbs.; hyposulphite of soda, 2½@3c @ ½ lb.; blue vitriol, 5½@6c @ ½ lb.; borax, concentrated, 7@8c @ ½ lb.; chlorate of potash, 12@13c; roll sulphur, 3c; alum, \$2.00@2.25; flour sulphur, French, 3½c @ 3½c; California refined, 2@2½c; nitric acid, in carboys, 8c @ ½ lb.; caustic soda, in drums, 3@4c @ ½ lb.; Cal. s. soda, bbls., \$1.25 @1.50 @ 100 lbs.; sks, \$1.05; chloride of lime, spot, \$2.50@2.60; nitrate of potash,

in bbls, 8c; caustic potash, 10c in 40-lb. tins; sulphide of iron, 9c @ ½ lb.

OILS.—Lined, bbls., 54c; cs., 59c; raw, bbl., 52c; cs., 57c; lots of 5 bbls., 1c less; Lucol oil, bbl., 48c; cs., 53c; raw, bbl., 46c; cs., 51c. Kerosene—Pearl, per gal., 21½c; Astral, 21½c; Star, 21½c; Extra Star, 24c; Ecocene, 23½c; Elaine, 26½c; Water White, in bulk, 15c; Mineral Seal, iron bbls., 19c; wooden bbls., 22½c; cs., 25c; Mineral Sperm, cs., 26½c; Deodorized Stove Gasoline, bulk, 17c; do., cs., 23½c; 88° Gasoline, bulk, 21c; do., cs., 27½c; 83° Naphtha or Benzine, deodorized, in bulk, per gal., 16c; do., in cs., 22½c; Lard Oil, No. 1 bbl., 95c; cs., \$1.00; Neats-foot Oil, bbl., 70c; cs., 75c; No. 1 bbl., 55@57½c; cs., 57½@60c; Sperm, crude, 50c; Natural White, 65c; Bleached do, 70c; Whale Oil, cs., 52½c.

WHITE LEAD.—For lb., in kegs: Five tons and over at one purchase, per lb., 6c; 1 ton and less than 5 tons, per lb., 6½c; 500 lbs. and less than 1 ton, per lb., 7c; less than 500 lbs., per lb., 7½c; in 25-lb. tin pails, ¾c per lb. above keg price; in 1 and 5 lb. tin cans, 100 lbs. per case, 2½c per lb. above keg price. Dry Lead.—In bbls., 1 ton and over, 6c; do. in kegs, 6½c.

RED LEAD AND LITHARGE.—One ton and over at one purchase, per lb., 6c; 500 lbs. and less than 1 ton, per lb., 6½c; less than 500 lbs., 7c.

ASSAY LITHARGE.—Per lb., 8½c.

BISMUTH.—Subnitrate, per lb., \$1.60.

BONE ASH.—4c @ ½ lb.

BORAX.—Crystal, 7c; calcined, 25c.

CHROMIUM.—(90% and over) per lb., \$1.25.

COPPER.—Carbonate, 20c; Red oxide, ½ lb., 60c.

MANGANESE.—(90% and over) ½ lb., \$1.25.

MERCURY.—Bichloride, ½ lb., 90c.

MOLYBDENUM.—25c. ½ gramme; 1000 grammes—2½ lbs.

PHOSPHORUS.—(American) ½ lb., 80c.

SILVER.—Chloride, ½ oz., 75c; nitrate, 55c.

SODIUM.—Metal, ½ lb., \$1.00.

URANIUM.—Oxide, ½ lb., \$3.50.

ZINC.—Metallic, chemically pure, ½ lb., 50c.

ZINC.—Dust, ½ lb., 10c.

ZINC.—Sulphate, ½ lb., .04c.

(These prices are wholesale, f. o. b. San Francisco, unless otherwise noted.)

SITUATIONS WANTED.

Experienced Metallurgical Chemist who has operated lead and copper blast furnaces wishes position. Address "Geary," this office.

Experienced assayer, mine surveyor and chlorinator wishes position in any capacity at mine or mill. Address "Auburn," this office.

Cyanide Chemist wants position. Amalgamator and assayer. Graduate School of Mines. First-class references. Address "Cyanide," this office.

Superintendent, competent assayer, chemist and surveyor, experienced in development work, wishes position in any capacity. "Seattle," this office.

Cyanide man and assayer wants position. Can take shift on mill if needed. Practical experience and reliable. C. F., Mining and Scientific Press.

Engineer wants position to run hoist or mill engine or pump. Use to combustion of oil and Corliss engines. Have recommended. Good mechanic. R. Blackwell, Elsinore, Riverside Co., Cal.

Mining Engineer with twelve years' practical experience in mines and mills wants position as superintendent. School of Mines graduate. Has had extensive experience in developing prospects into shape for actual working on a large scale. Also practical cyanide manager, assayer and surveyor. Address "Engineer," this office.

Wanted, position as manager or superintendent of mining property, or would accept a position as consulting engineer. Have had over thirty years' experience and can refer to some of the best known people, both on this coast and in the East. Salary not so much an object as permanent employment. Address "Mine Superintendent," care of Mining and Scientific Press, 330 Market St., San Francisco, Cal.

Bookkeeper and Accountant, American, 29 years of age, desires position with first-class mining company in United States or Mexico, if locality healthy. Having had twelve years' experience in wholesale commission and export business in San Francisco is thoroughly conversant with modern business methods, including purchase and transportation of merchandise. Can furnish unqualified references as to character and ability. Address Accountant, this office.

THE CALIFORNIA DEBRIS COMMISSION having received applications to mine by hydraulic process from Geo. and Lee Pease, in St. George Mine, near Yankee Jim, Placer County, Cal., draining into Devil's Canyon Creek, which reaches North Fork of American River; and from A. Lundberg, in Old Stiff Gravel Mine, near Vallecita, Calaveras County, Cal., draining into Wades Gulch, thence into Coyote Creek, which reaches Stanislaus River, gives notice that a meeting will be held at Room 95 Flood Building, San Francisco, Cal., Dec. 15, 1902, at 1:30 P. M.

MACHINERY FOR SALE.

OFFICE OF GRANITE-BIMETALLIC
CONSOLIDATED MINING CO.

PHILIPSBURG, MONT., October 15, 1902.

Consolidation of plants and change to electric power permit us to offer, subject of course to prior sale, the Engines, Boilers, Machinery, etc., covered by the following list, at greatly reduced prices:

SECOND-HAND MACHINERY ON HAND.

ENGINES.

- 1 Fraser & Chalmers Cross-Compound Condensing Corliss Engine, 22 in. and 38 in. dia. x 60 in. cylinders, 500 H. P., with jet condenser.
- 1 same as above with Knowles Vacuum Pump and Condenser.
- 1 Fraser & Chalmers Corliss Engine, 18 in. x 42 in., 227 H. P. at 100 lbs., cut-off at $\frac{1}{4}$ stroke.
- 1 Hor. Atlas Engine, 8 in. x 12 in., 25 H. P.
- 1 Hor. Atlas Engine, 9 in. x 14 in., 30 H. P.
- 2 McIntosh & Seymour High Speed Engines, 9 in. x 12 in., 30 H. P.
- 1 McIntosh & Seymour High Speed Engine, 7 in. x 12 in., 15 H. P.
- 3 Upright Engines, 8 in. x 8 in., 15 H. P.

AIR COMPRESSORS.

- 1 Ingersoll Straight Line Air Compressor, steam cyl. 24 in., air cyl. 24 in., stroke 30 in.
- 1 Ingersoll Straight Line, steam cyl. 16 in., air cyl. 16 in., stroke 34 in.
- 1 Norwalk Compressor, steam cyl. 14 in. L. P., air cyl. 16 in. H. P., air cyl. 10 in., stroke 16 in.
- 1 Knowles Hor. Compressor Blower, steam cyl. 12 in., air cyl. 20 in., stroke 24 in.

HEATERS.

- 1 Tubular Heater, 80 in. x 9 ft.
- 1 Tubular Heater, 36 in. x 12 ft.
- 1 Tubular Heater, 18 in. x 9 ft.
- 1 Tubular Heater, 36 in. x 7 ft. 6 in.
- 1 Tubular Heater, 36 in. x 10 ft.

AIR RECEIVERS.

- 6 Air Receivers, 60 in. x 20 ft.
- 1 Air Receiver, 48 in. x 15 ft.
- 1 Air Receiver, 36 in. x 13 ft.
- 1 Air Receiver, 36 in. x 9 ft. 6 in.
- 1 Air Receiver, 42 in. x 8 ft.

PUMPS.

- 1 Knowles Compound Condensing Duplex Plunger Pump, special pot-valve pattern. L. P. steam cyl. 24 in., H. P. steam cyl. 14 in., stroke 18 in. Scotch vacuum pump 8 in. x 12 in. x 12 in.
- 1 Knowles Compound Condensing Duplex Plunger Pump, 1 L. P. steam cyl. 18 in., H. P. steam cyl. 10 in., Dia. plungers 7 in. Stroke 18 in. Vacuum pump $6\frac{1}{2}$ in. x 12 in. x 10 in.
- 1 Knowles Double Plunger Pump, special pot-valve pattern, 18 in. x 24 in. steam cyl., 8 in. plungers.
- 1 Knowles Double Plunger Pump, same as above.
- 1 Station Pump, 14 in. x 16 in. cyl., 7 in. plungers
- 4 Boiler Feed Pumps, 8 in. x 10 in. cyl., 5 in. plungers.
- 3 Knowles Sinking Pumps, 14 x 7 x 5 x 10 in.
- 1 Knowles Sinking Pump, 12 x 8 $\frac{1}{2}$ x 6 x 12 in.

PLANERS.

- 1 Iron Planer, 7 ft. x 21 in. bed, planes 34 in. high, 24 in. wide, ways 9 ft. 6 in. long (Lathes & Morse Tool Co., Worcester, Mass.)
- 1 Planer, 20 in. x 5 ft. bed, planes 21 $\frac{1}{2}$ in. wide, 24 in. high, ways 7 ft. 6 in. long.
- 1 L. B. Reed (Cairo, Ill.) Planer, planes 33 in. x 30 in. between uprights, 24 $\frac{1}{2}$ in. x 9 ft. 6 in. long.

LATHES.

- 1 Fifield Engine Lathe, swing 30 $\frac{1}{2}$ in. Dis. centers 16 ft., bed 21 ft. over all.
- 1 L. B. Reed (Cairo, Ill.) Lathe, swing 24 in. Dis. centers 8 ft.

DRILL PRESS.

- 1 Vertical Drilling Machine, table 30 in. dia.

BOLT CUTTERS.

- 1 Bolt Cutter, hand or power, cuts pipe up to 2 in. dia.
- 1 Bolt Cutter, cuts pipe 1 $\frac{1}{2}$ in. and under.

DYNAMOS.

- 1 T. H. Motor, Type "E," 250 light, 110 volt.
- 1 T. H. Motor, 250 light, 110 volt.
- 1 T. H. Motor, Type "E-1," 200 light, 110 volt.

DIAMOND DRILL.

- 1 American Diamond Drill Boring Co., 115 Courtland St., New York. Double cylinders 4 in. x 4 in., tube bore 1 $\frac{1}{2}$ in. Drills 1 $\frac{1}{2}$ in. hole. For steam or air.

For further information, prices, etc., address
WERNER ZIEGLER, Supt. Granite-Bimetallic
Consolidated Mining Co., Philipsburg, Mont.

For Sale, Cheap for Cash.

- 20-Stamp Mill,
- 1 Corliss Engine,
- 1-70 H. P. Boiler (good as new),
- 6 Concentrators,
- 2 Large Pumps, 1 Feed Pump,
- Some Belting, Fixtures, etc.

7 miles from Redding, Cal., 4 from Keswick.
H. C. Woodrow,
WHITEHOUSE P. O., SHASTA CO., CAL.

FOR SALE--A BARGAIN.

- 3 Practically New Five-Foot Huntington Mills with Extras. All in Al Condition.
 - Also, 1 New Four-Foot Frue Vanner.
 - Absolutely New. Perfect Condition.
- Address FRICOT & MILLER,
Latrobe, El Dorado Co., Cal.

FOR SALE.

- 1,000,000 ft. of standard black wrought iron pipe, second hand, in good condition, size $\frac{3}{4}$ to 12 in.
- 500,000 ft. of flanged wrought iron casing, size 2 to 6 in.
- 225,000 ft. of flanged threaded end casing, size 2 to 3 $\frac{1}{2}$ in.
- 10,000 ft. of 6-in. riveted steel pipe.

ENGINES.

- One 30x60 right hand Fraser & Chandler Corliss engine with flywheel 18 ft. dia. x 44 in. face, complete, in first-class order, ready for immediate delivery.
- We also have with this engine a triple leather driving belt 160 ft. (endless.)
- One 16x38 left hand Corliss engine with flywheel 11 ft. dia. x 30 in. face, complete and in first-class order.
- One 24x48 Wheelock Corliss engine
- One 20x32 Webster, Camp & Lane double cylinder double drum hoist.

BOILERS.

- One 250 and one 450 H. P. Hazleton tripod boilers.
- Two 104 H. P. Abendroth & Root boilers.
- Two 185 H. P. Abendroth & Root boilers.
- Four 250 H. P. Campbell & Zell water tube boilers.
- Four 135 H. P. Babcock & Wilcox water tube boilers.
- One 75 H. P. Heine water tube boiler.

AIR COMPRESSOR.

- One 20x24x34 National Drill & Compressor Co. air compressor.

The above items do not represent all of the machinery we have in stock. In addition, we offer you all kinds of automatic, compound and slide valve engines, ranging in size from 3 to 250 H. P. Horizontal tubular boilers ranging from 10 to 150 H. P. Vertical boilers, both submerged and full length tubes, from 5 to 100 H. P. Fire-ho boilers from 15 to 100 H. P. One Silsby fire pump; besides we have single, duplex and compound pumps of every size. 100,000 ft. of fire hose from the Pan-American Exposition. Hoisting rope of all sizes. Shafting, pulleys, belting and a full line of mill supplies. Four turbine water wheels from 25 to 80 H. P.

Ask for Our Complete Catalogue No. 360.

CHICAGO
HOUSE WRECKING CO.

West 35th and Iron Streets,

CHICAGO, ILL.

AT A BARGAIN.

- 2 PELTON WATER WHEELS, 6' diameter with sheet steel discs $\frac{3}{8}$ " thick secured to 3" shafts 4 $\frac{1}{2}$ " long.
- 42 BRASS BUCKETS, 3' across face and riveted to steel disc 5 $\frac{1}{2}$ " apart.
- STAND PIPE FOR TWO NOZZLES, one $\frac{3}{4}$ " diameter, the other 1 $\frac{1}{8}$ " diameter. Lever and hood for closing 1 $\frac{1}{8}$ " Nozzle. Size of Stand Pipe 4" diameter.
- 2 SHEET IRON HOODS for Wheels.
- WHEELS built for 400' head.

Address
CALIFORNIA POWDER WORKS
330 Market Street,
SAN FRANCISCO, CAL.

Second Hand Machinery.

ALL MACHINERY IS REBUILT AND
FULLY GUARANTEED.

Many of the largest mines, mills and smelters are our regular customers. A good stock of all kinds of machinery always on hand. Send us your name and we will keep you posted on bargains in machinery.

S. S. MACHINERY COMPANY,
Office, 1529 Lawrence St. Denver, Colo.
Works, 6th and Market St.

ENGINES, BOILERS,
PUMPS, Etc.

The UNITED RAILROADS offers for sale, in good order, the following machinery:

- 2 sets of Cross Compound Condensing Engines, Scott & O'Neill cut-off, of 750 H. P. each; cylinders 29 in.—44x60 in. stroke, with direct acting air pump and condenser, Union Iron Works, builders. This firm built the U. S. warship "Oregon."
- 2 Circulating Pumps for condensing plant, Thompson & Evans, builders.
- 6 Elephant Type Boilers, 60 in. x 16 ft., 150 H. P. each, set independent, Union Iron Works, builders.
- 2 Boiler Feed Pumps, Thompson & Evans, builders.
- 1 Deep Well Pump, Thompson & Evans, builders.
- 1 Double Reversible Link Engine, about 15 H. P.

ALSO,

- 2 sets of Engines built by the Risdon Iron & Locomotive Works, each set consisting of a triple expansion jet condensing engine 15x24x38 in., of 550 I. H. P., high and intermediate pressure cylinders being tandem, of the Reynolds & Corliss types, and the low pressure being a cross with Myers cut-off, each set having an independent air pump division steam end 12x16 in. with Risdon Iron Works condenser.
- 5 Sterling Boilers, 250 H. P. each, drums 2 ft. 10 in. x 11 ft., and 24 tubes.
- 2 Risdon Condensers.
- 1 Circulating Engine.
- 2 Risdon A'r Pumps 9x15 in.
- 1 Davidson Fire Pump 5x7x10 in.
- 2 Davidson Feed Pumps No. 5.
- 1 Dow Duplex Pump 5x6 in.
- 1 Centrifugal Pump.

APPLY:

UNITED RAILROADS,

Purchasing Agent,

49 Second St., Room 86,

San Francisco, Cal.

SECOND-HAND

Dynamos, Motors, and Electrical Appliances.
All Money Savers.
Repair Anything.

Have You a Dynamo or
Motor For Sale?

GUARANTEE ELECTRIC COMPANY,
8 W. Cor. Adams and Clinton Sts., Chicago.

FOR SALE.

For Sale--1 Elmore Hand Power Mining Drill.

Practically new. Cost \$150.00. o. b. cars manufacturers. Will sell for \$75.00 cash f. o. b. cars S. P. Railroad station. Address "Hardup," this office.

FOR SALE.

MINERAL COLLECTION--Over 100 small typical specimens of ores and minerals, with scale of hardness. Just the thing for students or prospectors. H. S. Durden, 1760 Union St., San Francisco.

FOR SALE CHEAP.

- 35 Tons 35-lb. Relaying Rail, \$30 per Ton
- 30 Tons 25-lb. Relaying Rail.
- 100 Horse Power Fire Box Boiler.

S. D. BURNS,
318 BUSH STREET, SAN FRANCISCO, CAL.

The Mines Exchange, Ltd.

MINES and MINING STOCKS.

Address nearest office for reports or quotations.

OFFICES:

Nelson, 1006 Chicago Opera House Bldg., Salmon,
B. C. Chicago, Ill. Idaho.

WANTED.

WANTED.

Second-hand, high speed horizontal tandem compound condensing engine, 400 to 500 horse power, arranged for belting; also air pump and surface condenser. But slightly used. Give full particulars.

Address "Electric," care of this office.

BUSINESS OPPORTUNITIES

I CAN SELL YOUR BUSINESS no matter where it is. Send description, state price, and learn how. Established 1896. Highest references. Offices in 14 cities. W. M. Ostrander, 1550 N. A. Bldg., Philadelphia

PRINTING We furnish all stock and do printing at the following prices: 100 envelopes 40 cts., 500 \$1.25, 1000 \$1.75. Bill heads, note heads, cards, tags, etc., at same price. Samples of work free. Pacific Commercial Co., 325 Davis St., San Francisco, Cal.

MICHIGAN WIRE CLOTH CO.

20 YEARS' EXPERIENCE AS MANUFACTURERS OF

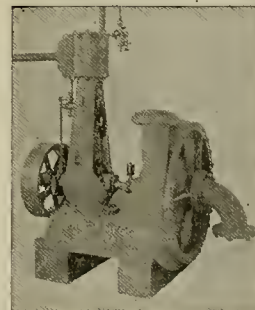
Mining Wire Screens

OF ALL KINDS.
FOR EVERY PURPOSE.

Quality Guaranteed.
Prices Low.

WRITE FOR CATALOGUE.

502 HOWARD ST., DETROIT, MICH.



MODERN MINING MACHINERY.

QUARTZ MILLS of any capacity,
IN UNITS OF TWO AND FIVE STAMPS.

Acme Amalgamators for Beach Sands
and other placer mining. Successfully applied to quartz mills in addition to or displacing plates.

SUCCESSFUL GRAVEL MILL RECENTLY IMPROVED
Special Gold Dredging Pumps and Machinery. Concentrators, Feeders, Rock Breakers and Power Plants.
Largest manufacturers of Irrigation and Reclamation Pumps in the United States.

Catalogues: No. 20, Pumps; No. 22, Beach and River Sands; No. 25, Mining.

KROGH MANUFACTURING CO.,
Office, 519 Market Street. Works, 9-17 Stevenson Street,
SAN FRANCISCO, CAL.



selected by an expert mineralogist; accurately labeled, scientifically classified. For 26 years we have supplied mining schools throughout the world. "Prospectors' Collection," 130 specimens 1 $\frac{1}{2}$ in. sq., in oak cabinet, \$8.60. Other sets up to \$125 for miners, chemists, and engineers. Illustrated Catalogue Free. Crystals and Ores purchased. Mail small samples.

FOOTE

MINERAL CO., Dept. B.
1317 Arch Street, Philadelphia, Pa.

THE MACHINERY DEPOT OF THE WEST
THE S. H. SUPPLY CO.
22ND AND LARIMER STS., DENVER, COLO.

MINING AND SCIENTIFIC PRESS

Whole No. 2212.—VOLUME LXXXV.
Number 24.

SAN FRANCISCO, CAL., SATURDAY, DECEMBER 13, 1902.

THREE DOLLARS PER ANNUM.
Single Copies, Ten Cents.

The Importance of Formation.

There are those who appear to lay great stress upon the character of the formation inclosing a mineral vein. That this is a matter of grave importance is very doubtful, for it is rather the condition of the inclosing vein walls than their kind, in which the trained mining engineer seeks for an indication of values he cannot positively see. It would be difficult to find a kind of rock in which no mineral veins of value exist, excepting possibly in basalt and the glassy variety of volcanic and intrusive rocks known as obsidian and vitrophyre. Paying mines are found in typical sedimentary beds, as those on the Witwatersrand, and in the quartzites of South Dakota, in Colorado, in southern California and elsewhere. Payable mines are found in all the older crystalline rocks, from the Archæan upward, and in almost every variety of eruptive and volcanic rock known to science, with the possible exception of those first cited. There are mines in granite, in slate, in shale and sandstone, in greenstone, in massive tuffs and breccias.

It has been demonstrated for years that there is no particular importance to be attached to the fact that a mine occurs in this or that formation; but, notwithstanding this, there is a prejudice among many miners for certain kinds of formation and

against others. When one is found having these prejudices, it will usually be learned that he is predisposed in favor of that kind of rock in which he has had the good fortune to "strike it rich," or has seen others do so, while at the same time he has a prejudice against granite because "the veins do not go down," and against limestone because "it is unreliable and bunchy," but he will squander his time on a slate and porphyry or greenstone contact because some great mines are found associated with these formations.

As against this, the miner who has been fortunate in granite or limestone is suspicious perhaps of slate and greenstone or porphyry, while the miner whose

whole experience has been gained in andesite may know nothing of either the granite nor limestone possibilities, and yet each of these formations and many others are equally good ore carriers.

As previously stated, it is the condition of the rock rather than the kind that often affords an index of possibilities to the experienced eye. These conditions are so various that it would be impossible to describe, even in a general way, their numerous characteristics short of a volume, and even then much must remain unsaid. The careful engineer may sample a mine ever so thoroughly and take due cognizance of all exterior facts, having a bearing upon the economics of the proposition under investigation,

and still, to a great extent, he will be guided by intuition—some call it judgment—in drawing his final conclusions and in making recommendations for the future. This intuition or judgment can only come with long and wide experience in many mining fields. If he is a broad-minded and careful observer without prejudice, he will give no attention to the kind of rock inclosing the mineral deposit, but will seek for physical evidences of its condition, the character of the fissure and its walls, the occurrence of intrusive dikes and their apparent relation to the ore deposits and its effect upon them. Volumes have already been written by most competent observers on the "Genesis of Ore Deposits," and many volumes still remain to be written to explain, with the light of wider experience, many of the problems which now perplex the working miner.



Mill and Smelter, Pride of the West Mine, Washington, Arizona. (See page 340.)



MINING AND SCIENTIFIC PRESS

Smelter Pride of the West Mining & Milling Co., Washington, Arizona. (See page 340.)

MINING AND SCIENTIFIC PRESS.

ESTABLISHED 1860.

Published Every Saturday at 330 Market St., San Francisco, Cal.

TELEPHONE, DAVIS 771.

ANNUAL SUBSCRIPTION:

United States, Mexico and Canada..... \$3.00
All Other Countries in the Postal Union..... 5.00

Entered at the San Francisco Postoffice as second-class mail matter.

Chicago Office (Telephone, Harrison 78) 787 Monadnock Block.
Denver Office (Telephone, Olive 783) 606 Mack Block.

J. F. HALLORAN..... Publisher.

San Francisco, December 13, 1902.

TABLE OF CONTENTS.

ILLUSTRATIONS.—Mill and Smelter, Pride of the West Mine, Washington, Ariz.; Smelter Pride of the West M. & M. Co., Washington, Ariz., 334. Belcher and Red Rock Mines, Providence, Ariz., 338. Coal Pocket Elevator and Conveyor, 339. Mill and Patio, Etzatlán, Jalisco, Mexico; Old Arrastra, Etzatlán, Jalisco, Mexico; Oil Formation, San Emidio Canyon, Cal., 340. Mining and Metallurgical Patents, 341-342.
EDITORIAL.—The Importance of Formation, 334. The Downward Tendency of Silver; The Metric System; English Speaking Miners; Ventilation in Mines; Assessment Work on Claims; Eastern Promoters of Mining Stocks, 335.
MINING SUMMARY—343-344-345-346-347.
LATEST MARKET REPORTS—348.
MISCELLANEOUS.—Concentrates, 336. Mine Timbering by the Square Set System at Rossland, B. C.; Notes on Assaying, 337. Belcher and Red Rock Mines; Forfeiture and Failure to Contribute to Assessment Work; Cyaniding Silver Ores, 338. A Dry Process for the Treatment of Complex Sulphide Ores; Coal Pocket Elevator and Conveyor, 339. A Mexican Mill and Patio; Topography of a California Oil Field; Power in South Africa; The Pride of the West M. & M. Co., Washington, Ariz., 340. Magnetic Concentration of Ores, 341. Mining and Metallurgical Patents, 341-342. The Most Economical Engine, 342. Personal; Commercial Paragraphs; Book Notices; New Patents; Notices of Recent Patents, 347-348.

ADVERSITY usually develops the latent powers of men and urges them onward to undertake acts previously considered too difficult or impracticable. The downward tendency of silver will seriously affect a large number of mines; but heretofore depreciation of this metal has only stimulated men to new and greater endeavor, and the result has been the discovery and development of new gold mines, and most often these have been found in the heart of the silver-mining districts. It is only natural to assume that this additional decline in silver will be the stimulus which will result in the discovery of other new gold districts and in the development of gold-hearing mines already known.

OBJECTIONS in and out of engineering circles continue to be made against the introduction of the metric system, some of them excellent objections, and well founded. But the metric system will prevail just the same. Conservatism has held back many things and has its uses, but sooner or later the spirit of progress breaks bounds and more direct methods are put in force. The system of standard time was fought for twenty years; in some sections it never has been accepted, but yet generally prevails, and few would go back to the system of time-keeping in vogue in this country prior to 1883. Some time, whether in 1912 or 1952, men will look back at the present cumbersome system of weights and measures and wonder how the spirit of twentieth century and American progress endured such a handicap.

THE manager of the Jumper mine, Stent, Tuolumne county, Cal., has a placard announcing that no one will be employed there who can not talk English. The fact emphasizes the influx of many in the coal and metal mines of this country who do their talking and their thinking in another language than the one generally spoken. The same thing is observable also in England and Scotland. So great is the proportion of alien miners in Scotland of late years that in Lanarkshire nearly 5000 Poles and Lithuanians are now employed with Scottish miners, and in a number of cases the mine rules have been translated into the Russian language and hung alongside the English prints. It is not because of prejudice against foreign labor in the mines of America that reference is made to this matter, but because the presence of men who are unable to speak or understand the English language are in momentary danger themselves, and their presence is a menace to the lives of others. Within the week a Slavonian miner, unable to understand a shout of warning spoken in English, was killed in the Eagle-Shawmut mine, Tuolumne county, Cal. He was unable to make it understood at which level he was to get off the skip. In the event of danger, evident to those foreign-speaking miners, they always call to

each other in their native tongue, and English-speaking men, unable to understand, are sometimes injured in consequence.

Ventilation in Mines.

Of equal importance with safety appliances and precautions in the development, equipment and operation of mines is the necessity for an abundant circulation of pure air in mine workings. Excepting in coal mines, and certain metal mines, where fire damp occurs, though the latter are comparatively rare, too little attention is given to ventilation. Incidentally some mines, through the agency of connections with neighboring property, or by reason of having two or more shafts connected within their own lines, are splendidly ventilated. In such mines only raises, winzes and the bottoms of the main shafts are points where air is temporarily badly ventilated, but even these are far superior to the main workings of other mines not having the advantages of several shafts or outside connections.

In seeking the reason for this neglect to provide proper ventilation it is found that in the early history of the mine a ventilating fan of small size was put in and run until it became absolutely impossible to continue development without more air. A larger blower, sufficiently large for all time, it was supposed, was installed with a special engine and run it, and a new 12-inch pipe line. Down to 1000 feet this ventilating fan and engine may have answered admirably, and made it possible to supply every drift, raise, stope and other excavation with fresh air. But mining operations do not cease, and year by year the workings become deeper and deeper, the long levels are driven out longer, and each succeeding day finds a constantly increasing need of more pure air. While the existing condition is recognized, usually from reasons of economy—false economy—nothing is done to provide better ventilation, and so the situation grows daily worse. Finally, the lower levels, at a distance from the shaft, become simply intolerable. The air is always dense, close, hot, heavily laden with nitrous and carbonic gases, and unfit to breathe. The men stagger from the freshly blasted faces and stopes, rendered weak and sick from lack of oxygen and from breathing poison. Something must be done to improve conditions or work cannot progress. Happy thought. A new ventilating fan is placed on the 1000 or 1200 level, run by water motor driven by mine water caught up several hundred feet above, or if sufficient power is not obtainable in this manner the fan is run by electricity. This new fan is intended to furnish "pure" air to all workings below its station. But does it accomplish the desired result? Scarcely. It will produce a current of air, but the air driven down into the lowest levels is that which is forced out of the long drifts and stopes of the level where the new fan is situated, and from the levels above, and this air is already overlaid with foul gases. These old levels and stopes are full of rotting timbers, which furnish an immense amount of carbonic acid gas, beside that expelled from the lungs of the workmen, and the further exhaustion of the oxygen by breathing and the lights. In certain portions of the mine where the conditions are almost unendurable the superintendent favors the workmen by removing them, and in turn permitting them to work in various parts of the mine where the air is a little better.

Where air compressors are employed to supply machine drills the exhaust of the drills furnishes a given amount of air, but even this is laden with the oil driven into the pipe line from the cylinders of the air compressor, and not particularly agreeable to breathe if one were out of doors, but the miners gladly welcome even this small advantage in their position, if it is an advantage.

Is it economy at all to permit such a condition to obtain, or having been reached, to allow it to continue? It is a recognized fact that this ventilating apparatus was at one time efficient, but the mine usually, sooner or later, outgrows it. Is it not far more economical to provide the power with a fan large enough to thoroughly ventilate the mine, and to drive a sufficient volume of pure, fresh air from the surface to every heading, raise and stope that the men may accomplish more work—and this they certainly can, and will, too, without urging.

The unfortunate miners are afflicted with "miners'

consumption" and it is "hereditary," is the common expression. Nothing of the sort. It is simply that they are starved for lack of the life-giving oxygen, and though they are stout, hardy men, human endurance has its limit with the strongest of them.

It is not only proper to provide a sufficient supply of fresh air to the men below ground, but it is good business, and the increased amount of work accomplished by the miners will quickly pay for the entire expense of the new ventilating plant.

Decaying timbers in mines create a vast amount of carbonic acid gas, and the removal from the mine of all decayed timber that can be recovered will do much to improve the condition of the air, even though it be still fairly good. The practice of throwing decayed timbers in the "fill" of the mine is a very bad one, for while it is only temporarily serviceable as filling, it vitiates the air to an extent far beyond its value as filling, and it really costs little to hoist it to the surface.

JANUARY, 1903, is approaching. Those owning claims upon which they have failed to do assessment work should have this work performed, if in their opinion the claim justifies the expense. One of the best safeguards to good title to a mining claim is to conform absolutely to the requirements of the United States laws in this regard. The law requires \$100 worth of development work or improvements on the claim. A necessary building, a road or a ditch which shall be of actual benefit to the property is permissible as assessment work. When the work is completed the claim owner should file notice with the county recorder setting forth the fact of such work having been performed, and a notice to the same effect posted on the claim. Claims located in the year 1902 require no assessment work during this year unless local law requires it, and this important matter may be put off until such time next year as will permit its performance before January 1, 1904, but such long-deferred work neither tends to develop the mining industry nor to insure the safety of the locator's holding. Some claim holders at this season, who have to travel long distances in order to perform the assessment work, do the work for two years at this time—that is, do the first \$100 worth in December and the second \$100 worth in January, 1903. This will hold the claim nearly two years, when the same method may be repeated. By this means a trip need only be made biennially. Claims located prior to January 1, 1902, upon which the holders have failed to perform the necessary work by midnight, December 31, 1902, are subject to relocation by others, but the former locator cannot hold said claim as against an adverse claimant unless he has actually begun the work and continues until it is completed.

THE natural leaning of most folks toward the hargain counter is worked by the Eastern promoter or dispenser of some mining stocks, the par value of the stock being put high and the price low. The investor when approached in his native lair in the corn fields of Iowa, or the natural gas belt of Ohio, asks: "What is the par value of this mining stock?" If he is told "\$10 a share," but is also told that he can get it for \$2 a share, he immediately figures that he will make \$8 a share on every share he buys, and regrets he can only buy 100 shares when there is such easy chance offered to make money. This is the kind of an investor who buys because he believes what he is told, and afterwards writes to a mining journal for its opinion as to the value of the stock. Then when he finally finds that the Eastern promoter has fooled him he blames Western mines and miners. There are, however, mining stocks that are to-day selling for 50 cents and \$1 per share that, with proper development of the properties, are susceptible of enormous increase in values. Of course just which of the "cheap" stock to buy and which to let alone is the all-important question, and, equally of course, is one to which no definite or satisfactory reply can be given. Cripple Creek, Colo., is adopting a plan which is good as far as it goes, viz.: A systematic effort to have Eastern investors withhold any purchase of mining stocks until they have first secured trustworthy information from there as to the merit of the proffered holdings. Such a general campaign of information would be of commensurate benefit.

Concentrates.

A NICKEL-STEEL alloy with 36% nickel has the lowest temperature coefficient known.

METALLIC piston rod packing is considered a necessity where superheated steam is used.

THERE is no California State law for the examination of stationary engineers; there is for marine engineers.

It is often cheaper to abandon a flitcher hole than to waste half an hour or more in a futile effort to cut it deeper.

THE quantity of zinc annually used in the cyanide process is estimated to constitute about 1% of the total annual zinc production.

TO SOLDER a piece of carbon and a piece of brass together, copper the carbon with a battery and attach the brass with soft solder.

WHERE a cross-bit in a machine drill refuses to turn and the drill may be withdrawn a chisel-bit will frequently operate successfully in finishing the hole.

A CHEAP and easy way to generate oxygen is to heat a mixture of manganese dioxide and potassium chlorate in a metallic flask. The gas should not be disengaged too rapidly, as it might thus occasion an explosion.

ROUND steel bars for car and skip axles are preferable to square bars with the ends turned to fit the wheels, as when worn the round bars may be cut in two with a hack saw and the worn ends welded to form a new ax.

TO DETERMINE the approximate horse power necessary to pump water to a given height by steam, multiply the total weight of water in pounds by height in feet and divide by 16,500. This allows for friction and steam loss.

IF A locates a placer claim, and no reference or stated knowledge of a lode claim therein, and B subsequently locates a known lode claim within the limits of A's placer claim, B can hold his lode location if A has not received a patent.

IT is asserted that an excellent fuel economizer and smoke preventive is made by inserting a pipe in the top of a stack, leaving an annular space of 3 inches between itself and the inside of the stack, extending 8 feet down into the stack and projecting 7 feet above it.

THE cyanide plant of the California King G. M. Co., at Placcho, Cal., is probably as large as any other in the country, having a daily capacity of 1800 tons. The Horseshoe M. Co., at Pluma, S. D., has a cyanide plant capable of treating 1250 tons every twenty-four hours.

THE best way to separate gold and molybdenite when occurring in a quartzose or other earthy gangue is by concentration, as it is almost impossible to amalgamate gold from its ores in the presence of molybdenum or its compounds. The price of molybdenum is quoted in this paper.

SOME smelters charge a stated sum per unit for zinc which occurs in ores when the quantity of zinc exceeds a stated percentage, for the reason that zinc is found to be detrimental to blast furnace operations, and requires certain corrective measures. Smelters which treat high-grade zinc ores employ a different type of furnace from that used in lead smelting.

COMPRESSED AIR can be used in steam engines without any change being made in the construction of the engine if the exhaust be large. A small exhaust will have a tendency to cause the moisture in the air to freeze as it escapes from the vent, but this may be remedied to some extent by causing the air to exhaust underneath water. A better, but more expensive method, is to reheat the air.

A CORNISH PUMP, 25 inches diameter, with 8-foot stroke, will lift 200 miners' inches of water 80 feet at ten strokes per minute. The column pipe should be 18 inches diameter. If the pump is double-acting, the diameter of pump should be 18 inches and diameter of column 13 inches. This requires 75 H. P. A centrifugal pump will accomplish the same result better with continuous flow and same power. The cost of installation of latter is also much less, the column being 12 inches.

A RUNNING wire rope needs a lubricant that will penetrate between all the wires, and must be free from acids. A good lubricant is made of tar, summer oil and mica axle grease in varying proportions to suit varying conditions. At the Lincoln mine, Amador county, Cal., crude petroleum has been successfully introduced as a "rope dope." The oil gives entire satisfaction under the existing conditions, viz., an inclined shaft 2000 feet deep and very wet in the lower portion.

NITRO-GLYCERINE AND NITRO-CELLULOSE are the principal ingredients in the great bulk of high explosives now manufactured. Sixty-two of the eighty-one different explosives consist mainly of either of these two, or of a combination of the two. Insoluble nitro-cellulose is known as guncotton, and soluble nitro-cellulose is known as collodion cotton. Ammonium nitrate is also largely employed in the manufacture of smokeless powder, which leaves no residue upon combustion.

THE best machine drill work in mines is accomplished where the drill runners and chuck tenders realize that a machine drill is an engine and not a piece of solid cast-iron which must be broken up with a hammer. In the majority of cases failure in a drill to do satisfactory work is more the fault of the men running it than of the machine itself. Failure to oil the various parts is a fre-

quent cause of trouble, and a slight slipping of the clamp on the bar will often result in the loss of a hole.

IF A, having applied for patent, fails to make the payment required by law—\$5 per acre—at the proper time, within sixty days of publication of notice of application for patent, patent will not be issued by the United States; but A does not forfeit his possessory title nor his rights obtained under the law governing location of mineral lands. Work performed by B in the meantime may stand as assessment work for A. If A wishes to give clear title to B, he must pay cost of obtaining patent.

WHERE the distance between the hoisting reel and the sheave in the head frame is so great that the rope requires an intermediate support, a grooved sheave 12 to 14 inches diameter running loose on a steel ax or travelling with the ax and situated in a frame built about midway between reel and head frame, will be found to give satisfaction. Solid cylinders in most cases offer so small a surface to the running rope that the latter cuts into the cylinder and also rapidly wears the rope.

HIGH GRADE primers, XXXX to XXXXXX, will generally be found to give better satisfaction than those of lighter grade. One reason for this lies in the fact that the high-grade caps, being more powerful, cause a more complete explosion of the nitro powder, consequently making a more effective blast. High-grade caps are particularly more desirable in wet holes. They are no more dangerous than the XXX caps, being made from the same material, though containing a larger quantity of the explosive—mercury fulminate.

WHEN a crosscut tunnel is projected to explore and develop a vein at considerable depth below the known portions of the vein, it may or may not encounter the vein in the pay zone. Frequently it does not; but if there are pay shoots on the vein, the miner need not be discouraged in finding his crosscut has not struck pay, as a drift to either side along the vein is more than likely to be encountered. When a long and expensive crosscut has been run, it would be unwise to discontinue the work until it had been demonstrated that all veins within the mineralized zone had been cut.

AN alloy said to be equal to cast iron in tensile strength is, according to an authority, made from two parts aluminum and one part zinc. It melts at about 797° F., does not readily oxidize, and resists corrosion well. There is no difficulty in preparing alloy castings having a tensile strength of 4000 pounds per square inch. The alloy, whose specific gravity is 3.3, resembles in its properties high-carbon steel. Alloys containing one to nine parts of zinc to one part of aluminum with specific gravities ranging from 4 to 6 do not appear to possess any particularly valuable mechanical properties.

IN a boiler that carries 100 pounds pressure and develops 100 H. P., as thirty pounds of water constitute a H. P. in this connection, 3000 pounds will be used per hour, or fifty per minute. Ignoring friction in the pipes and calculating that the pump works against 100 pounds pressure, dividing the pressure by .434 shows that it is equivalent to raising it 230 feet high. An automatic non-condensing engine in good order will require about thirty pounds of water per H. P. per hour. A direct acting steam pump may be assumed to require five times as much as the engine, making 150 pounds per hour or 2.5 per minute.

ANY United States assay office—whether at Boise, Idaho, Seattle, Wash., or elsewhere—will advance 90% on all gold received and after the determination of actual value will give a check on the San Francisco sub-treasury. That settlement is on the basis of fine gold. American, French and German gold is deemed nine-tenths fine, British gold eleven-twelfths. American gold coin is received at its face value till the wear or abrasion reaches one-half of 1%, when it is received by weight only. The San Francisco Mint can buy mutilated and uncurrent silver coins in sums in excess of \$3 at a price regularly fixed by the director of the United States Mint for silver contained in gold deposits.

TO DETERMINE what H. P. a shaft of a given diameter will transmit at a given number of revolutions per minute: Cube the diameter of the shaft; multiply the quantity by the number of revolutions per minute; divide this product by the constant number 75; the quotient will be the H. P. To determine the diameter of a shaft to transmit a given H. P. at a given number of revolutions per minute: Multiply the given H. P. by the constant number 75; divide the product by the cube of the diameter of the shaft. The quotient will give the required speed. If the diameter of shaft should be an odd size, take the nearest commercial size.

THE United States Statutes provide for the formation of townships as follows: "Whenever any portion of the public lands have been or may be settled upon and occupied as a townsite, not subject to entry under the agricultural pre-emption laws, it is lawful, in case such town be incorporated for the corporate authorities thereof, and if not incorporated, for the judge of the county court in which such town is situated, to enter at the proper land office, and at the minimum price, the land so settled and occupied, in trust for the several use and benefit of the occupants thereof, according to their re-

spective interests; the execution of which trust, as to the disposal of the lots in such town, and the proceeds of the sales thereof, to be conducted under such regulations as may be prescribed by the legislative authority of the State or Territory in which the same may be situated." The townsite patent, however, does not convey any right whatever to the mineral contained under the surface.

REGARDING the lubrication of an air compressor it is to be borne in mind that air cylinders do not require oil either in quality or quantity like steam cylinders. What is good for the one is bad for the other. A steam cylinder needs an oil of low flashing point, and plenty of it, because the tendency of the wet steam is to wash the oil out of the cylinder. With air there is no washing tendency and a little oil will last for a long time. This oil should be of the best quality and of a high flashing point. It should not be a coking oil, that is when evaporated on a piece of hot metal it should not leave a carbon deposit. The actual amount of oil that should be used in an air cylinder is one-quarter that which should be used in a steam cylinder of the same size. Too much oil tends to choke the valves and ports. A discharge valve might stick through coking, and when stuck it will admit some of the hot compressed air into the cylinder against the receding piston, which on the return stroke is compressed and carried to a temperature beyond the flashing point. Sometimes when discharge valves give trouble they are cleaned by injecting kerosene, which is poor practice. Kerosene should never be used in the air cylinder; instead fill the oil cup with soapsuds made preferably of soft soap, and feed this into the cylinder; let the compressor work with soapsuds instead of oil for a day each week and no harm is done, care being taken to feed with oil a half hour before stopping, so that the parts may not be subject to rust, which is the only danger from soapsuds.

THE cost of a slimes plant to treat tailings from a 40-stamp mill will range from \$4000 to \$7000, depending on variable cost of suitable lumber, and whether plant is under cover or open. A long, narrow plant is less expensive than a square one. The sides of the building may be kept open during the spring and summer and inclosed in the fall by using the old canvas taken from the tables. It will be found that the canvas arrests the sulphides better when it has been in use for some time than when new, as new canvas has a tendency to hold sand as well as sulphides. Some operators paint their canvas when new. The lumber should be clear, and in any event knotholes must be avoided. It should be dressed on one side. The dry boards when first placed should be spaced $\frac{1}{2}$ to $\frac{3}{4}$ inch. The lumber will swell when wet and make a smooth surface. If the boards be placed close, upon becoming water-soaked, they will buckle. In some cases the boards are first soaked in water and then laid tight; but generally the spading method gives more satisfactory results. Particular attention must be given the construction of foundations, as the entire plant, to accomplish the best results, must form a perfectly even inclined plane. The question of grade must be determined by experiment, and, in view of this, the best plants are provided with a mechanical device for changing the grade of tables at will. This is effected by the employment of either cams or wedges. The grade is usually about $1\frac{1}{2}$ inch to $1\frac{1}{2}$ inch in 12 inches. Abundance of clear water is essential to the best results, as clean concentrates can not be obtained without "purifying," by which is meant the shutting off of the pulp and allowing clear water to run over the table to remove superfluous sand before sweeping or sluicing off the sulphides with hose and flat nozzle. In slimes plants the best results are obtained by the use of a hydraulic sizer (a form of the German splitzkasten) at the head of the plant, as the volume of tailings from the mill is too large to be successfully handled on the tables. A 40-stamp mill will discharge generally from 200 to 300 cubic feet of water per minute carrying 150 to 225 pounds of sand and sulphides. In some plants, where the sulphides or other high-grade value carriers are in a very fine state of division, the material is passed through a second sizer and the slimes run over a second series of tables set on a lighter grade. Material of this class requires very careful manipulation, as much of the highest grade material is held in suspension in the water. This may be collected in settling tanks arranged in series, and the suspended material thrown down by the introduction of quicklime, the stream being diverted to another series of tanks, while the slimes thus accumulated are removed from the first series. To best accomplish this the water should be decanted by means of holes in the side of the tank, arranged at varying elevation, and provided with wooden plugs. By this method a large percentage of the finest slimes are recovered. While the art of concentrating sulphides from tailings is not a difficult one to learn, a novice would make sad work at first without competent and painstaking instruction. There are men who have made and are still making this class of concentration their life study, and the frequent changes of method, though these are not radical, indicate that experimentation is going on and further improvements made in method. As a matter of course, a plant adapted to a smaller mill will cost proportionately less than the cost above given, which is for a 40-stamp mill crushing 3000 to 4500 tons per month. Where the topography of the ground will permit, the plant should be so arranged as to perform all operations by gravity, as a resort to mechanical means—conveyors or elevators—for raising pulp from one part of the plant to another involves a constant expense.

Mine Timbering by the Square Set System at Rossland, B. C.

The article by Mr. Bernard MacDonald which appeared with numerous illustrations in the issue of the MINING AND SCIENTIFIC PRESS of September 20th has attracted wide attention and comment in the mining world. At a recent meeting of the Canadian Institute, Mr. Ernest Woakes of Nelson, B. C., read the following interesting paper in discussion of the article by Mr. MacDonald:

I have read with much interest Mr. Bernard MacDonald's paper on the square set system of timbering used at the Le Roi mine and I should like to hear from that gentleman how he would have adapted his system to the peculiar conditions which existed at the Darien gold mines in the Republic of Colombia, South America, a mine of which the writer had charge some years ago.

In Vol. XXIX of the Transactions of the American Institute of Mining Engineers the above mine is fully described. The ore body may be roughly described as having the form of an irregular quadrilateral measuring 90 feet wide from north to south and 120 feet long from east to west, and standing nearly perpendicular. The country rock was a decomposed andesite having many cleavage planes, so that it was very liable to break up and cave if left unsupported. The ore body was composed of boulders and rock fragments from the adjoining country rock varying in size from pieces as small as a walnut to masses of many tons weight. These fragments are generally completely angular, partaking of a breccia-like formation, but at times they were rounded and resembled a conglomerate. The rock fragments are completely surrounded and cemented together by concentric shells of crystalline sulphurets and calcite with a little quartz. The gold was mostly free and was found almost entirely in the cementing materials. The ore was very high grade.

Timber was fairly plentiful, but, as in most tropical countries, the majority of it was of very poor quality. It commences to decompose almost as soon as cut, and for all underground purposes cannot be relied upon for much over twelve months. The square set system was introduced and practical men from Nevada were engaged to teach the natives how to prepare and set up the sets. Round timbers were used for the posts and nothing under 18 inches diameter was put in. The caps were flattened by adzing on two sides and the ties were of sawn lumber 8x10 inches. Great care was taken in setting the sills in each level—they were set north and south, east and west, with the idea of making sure that the uppermost tiers in one stope would eventually correspond as nearly as possible with the sill sets of the stope above. It was also found useful at times in the mine to know the exact bearing by means of the timbers. Very soon after starting stoping it was found to be necessary to keep the sets close up to the stoping faces or falls would occur. The conditions were much aggravated in the upper levels by the presence of old workings. Finally, after the whole width of the ore body had been stoped and the sets carried up from four to six sets high, it was found that the ore body was commencing to settle and the whole weight was on the timbers. Falls and caves became more frequent and finally a cave started above the upper floor and kept breaking away upwards to such an extent that it could not be caught up and eventually the whole stope crushed in, the timbers being forced out of plumb as the weight on them increased. False sets and diagonal braces were put in to resist the pressure, but this was of only temporary assistance. After the cave a tunnel was driven in the country rock round three sides of the ore deposit and crosscuts driven in from it and the ore extracted as it ran down, temporary sets being put in where necessary. In this way the ore was taken out until surface rock and tree stumps began to show in the stopes. In the deeper levels it was decided to try a different system. The square sets were put in as before, but were only carried three or four sets wide all round the ore deposit, leaving a large square pillar in the center which was taken out as far as was possible after the greater part of the ore body had been removed. Crosscuts were driven into the country rock from the various floors and the waste rock from these dumped into the stopes where the timber showed the worst signs of squeezing. It was not deemed prudent to leave any ore in the stope as filling, it being of such high grade that the loss would be very great. Besides, as is unfortunately so often the case, the mill was generally calling on the mine for ore. It was a very wet mine and the rainfall was excessive—110 inches a year. For this reason it was not desirable to have large open workings at the surface liable to sudden flooding, as would have been the case if filling from the surface had been resorted to, as is the case with the Ymir mine in this country. Of course, I believe that in most cases where wide deposits have to be worked the square set system of timbering is the most satisfactory, if the mine can stand the cost of it; and after the mines have attained a certain depth, it will often be found to be the only one possible. Luckily for mine managers, conditions such as above described are not likely to

exist very often; and if they do exist in the upper levels, it is to be expected that the ground will get harder and less liable to cave as depth is attained.

In reply to Mr. Woakes, Mr. MacDonald offered the following suggestions:

I have read with great interest Mr. Woakes' criticism on my paper, "Mine Timbering by the Square Set System," and also that gentleman's excellent article in Vol. XXIX of the Transactions of the American Institute of Mining Engineers, describing the Darien mine. I am sure any one who gives himself the pleasure of reading Mr. Woakes' description of this mining property will find corroborative evidence of the proposition that "no two mines are exactly alike."

In replying to Mr. Woakes' criticism, I do so with the full knowledge of the difficulty of prescribing for a patient, without first seeing him and studying the idiosyncrasies of the malady. Therefore, the method of stoping and timbering the ore bodies in the Darien mine, which I would propose as best suited for the peculiar conditions existing there, would be considered as given under existing circumstances.

As a general rule, when an underground ore body is being mined, greater strains are exerted on the timbers by the pressure on the enclosing walls than from the overhanging ore. On this account, the method of extracting the ore body generally adopted is by stopes or steps running horizontally within the vein and along it over the various levels, and the spaces thus exhausted are timbered by "floors" or square sets extending horizontally between the enclosing walls. This is the method described in my paper.

But it seems that the generally prevailing conditions in mining operations were quite reversed at the Darien mine, where the greater strains came from the overhanging ore, instead of, as is usual, from the enclosing walls. This might, in a measure, have been suspected from Mr. Woakes' description of the physical characteristics of the ore and the nearly vertical dips of the enclosing walls.

I would meet these reversed conditions by reversing the usual methods, or, I should say, direction of the stoping and timbering, viz.: I would run the stopes or steps of the excavation vertically upward between the mine levels, instead of horizontally over them.

For example: In stoping out any block of ore developed between two levels, I would first run a raise vertically through it, making such raise wide enough to be timbered into two compartments by two square sets going up in it side by side. When completed, this raise would furnish means of ventilation and access for men and material to whatever part of the ore body the work of stoping might be going on. I would then run all the stopes vertically upwards around this raise, commencing at the lower level and finishing at the upper level, mining out just enough ore at a time to admit of one new set of timbers being placed in the excavation. By this method all the ore, except the one stope being excavated, would be supported on a solid foundation of ore in place. In case lateral or vertical pressure would give the timber sets a tendency to swing or "jack knife" out of their true horizontal and vertical positions, as would probably be the case, I would keep the skeleton framework of the sets filled up with broken ore until all the block between levels was broken down. This method of temporary filling locks up for the time being about two-thirds of the ore in the stopes. The swell in volume of the broken ore over that in place is only about one-third. However, the two-thirds used for temporary filling could be drawn off after the work of stoping was completed, so that, except for the time being, no more ore used in filling would be lost.

Mr. MacDonald's idea is a thoroughly practical one, and would undoubtedly meet the peculiar requirements of the Darien mine, as well as any other. In addition to the advice of Mr. MacDonald, it is suggested that the method of framing timbers might also be changed to meet the heavy down weight. In timbering by the square set method there are three systems or combinations of systems. These are a system to resist a pressure mostly exerted from the side; a system to resist downward weight; and a system to resist a diagonal thrust, the latter being a combination of the other two. In the first system the timbers are so framed that the caps are butted together, forming a practically continuous cap from wall, the ties keeping the sets from riding. In the second system the posts are butted end to end, forming a continuous post, resisting the heavy down weight, and in the third either of these systems is supplemented by diagonal braces, placed within the sets, and heading upward toward the hanging wall. Large stopes in any sort of ground can be excavated in blocks of relatively small superficial area, as suggested by Mr. MacDonald, with greater safety than where large areas are removed at one time. Immediate and close filling in most cases are indispensable in connection with the square set method of

timbering. Ever since the square set was introduced in the Comstock lode by P. Deidesheimer in 1860 all attempts to support mountains on timber have proven abortive, and numerous caves in great mines everywhere that this "economical" method has been tried attest that contemporaneous filling is absolutely necessary to safety and complete removal of ore.

The means of obtaining filling is always important, because this must be accomplished at the least possible expense, and in some mines the grade of ore is so low as to make the employment of filling prohibitive. In such cases the only apparent remedy is to stope as far as it can be safely done, timbering by the square set method, and at the first sign of collapse to abandon the stope and avoid disaster. This is unsatisfactory to the mine owner; but, if any better way can be suggested, we would be pleased to learn something of it.—Ed.

Notes on Assaying.*

In very many assay laboratories it is customary to use for fluxing purposes borax of various and uncertain degrees of hydration. I have even seen used in several places the fully hydrated $\text{Na}_2\text{B}_4\text{O}_7 \cdot 10\text{H}_2\text{O}$, which contains 47% of water.

Such procedure appears obviously incorrect, since every single gram of such fully hydrated borax will give rise to .5 gram (half a gram) of water, which, at a temperature, say, of 200° C., will measure about 1000 cubic centimeters.

This will necessitate a considerable amount of dusting and unnecessary loss in the assay. Similar remarks apply to the use of more or less fully hydrated sodium carbonate and sodium bicarbonate. Looking at the subject from quite another point of view, one has to question the wisdom of handling by steamer and railway an excessive weight of material of which a large and useless percentage is water and carbonic acid, one or both.

In the formation of alkaline silicates by the action of Na_2CO_3 on SiO_2 , there is necessarily eliminated a certain quantity of CO_2 , but this takes place when the slag is already pasty or fused; hence, mechanical losses are probably totally absent.

On the other hand, when using either $\text{Na}_2\text{B}_4\text{O}_7 \cdot 10\text{H}_2\text{O}$, Na_2HCO_3 or $\text{Na}_2\text{CO}_3 \cdot 10\text{H}_2\text{O}$, there must first be formed in the crucible, respectively, $\text{Na}_2\text{B}_4\text{O}_7$, anhydrous, and Na_2CO_3 , anhydrous in the two latter cases before any fluxing action or fusion can take place.

Hence, as will be readily seen, very large volumes of gases will be given off while the whole charge is still in a pulverulent condition.

It is difficult to understand how such authorities, presumably practical, as Ricketts, Beringer and many others persistently recommend the use of NaHCO_3 (sodium bicarbonate), which contains superfluous water and carbonic acid, and these same authorities primarily recommend the use of hydrated borax, but mention anhydrous borax (borax glass) as an alternative. Of course, it is quite possible that with care the dusting losses from the use of hydrated fluxes might be—at least, in the case of low-grade ores, etc.—practically negligible; but is there any corresponding benefit to be obtained by running these risks, even if they are of the very slightest?

In laying out the reduction works for a mine, one has to consider the best positions for the various departments; and here comes in a point on which there is often a difference of opinion. I refer to the position of the assay laboratory with regard to the refinery or smelting room.

It seems to me that the assay laboratory and refinery should be quite distinct from each other, and if the assayer also does the smelting, all possible precautions as regards clothes and washing should be exercised, and all tools, fluxes, etc., employed in the refinery should be quite distinct from the assay laboratory equipment. On the other hand, it is the custom in many places, which I prefer not to name, though I can say they are not in South Africa, to have one common furnace room for both refining and assaying, and even in one or two cases to use the same furnaces for both classes of work; the results obtained occasionally can be guessed, especially when assaying low-grade material. The opinions of members of this society on this point would, doubtless, be extremely instructive and interesting.

The writer has found the following to be a perfectly accurate and very rapid method of assaying gold-bearing solutions when large volumes of solution have to be operated on:

The solution for assay is placed in a boiling flask of convenient size rendered strongly acid by sulphuric acid raised to the boiling point; about thirty grams of zinc shavings are then added in quantities of about five grams at a time, seeing that all action ceases from each addition of zinc before the next addition of zinc is made. The solution must be kept strongly acid throughout, adding more acid if necessary, and

*H. T. Durant, in Journal Chemical and Metallurgical Society of

must also be kept at boiling point throughout the whole operation.

After all the zinc has dissolved there will be a slight residue of lead, carbon, etc.; then remove from source of heat and add about one gram of precipitated silica to "collect." Then filter through a double filter paper and wash out flask well onto the filter paper; then fold up the moist filter paper and place on a layer of borax in a scorifier to dry and char slowly in front of the muffle; when this is complete add granulated lead or litharge and reducing agent and scorify as usual, cleaning the slag, if necessary. The method depends on the action of nascent hydrogen, and is by no means novel—at least in theory.

It would be unreliable in the case of assaying solutions for silver, since some of the latter metal would pass into solution as sulphate.

Belcher and Red Rock Mines.

In the narrow canyon of the Big Bug, Yavapai county, Ariz., is the mining camp of Providence,

property to reach your vein, the consent of the owner must be obtained. This could probably be best arranged in the form of a lease for a term of years, for which you annually pay a stated sum. If all the conditions are set forth in the lease and the same placed on record, it would be safe.

Cyaniding Silver Ores.

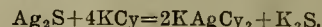
Written for the MINING AND SCIENTIFIC PRESS by
R. STUART BROWNE.

Since the discovery of the rich ore deposits in and around Tonopah, Nevada, a great impetus has been given to mining throughout the State. Many of the old mines that were shut down years ago are being opened up, and it is hoped that with the present advanced state of metallurgical knowledge and the lower cost of supplies to put them on a paying basis again.

A great deal of experimental work is being done in an effort to apply the cyanide process to the treat-

minerals and the usual porous condition of the matrix. I have seen accounts wherein it was stated that cyanide plants operating on these ores had been able to recover in the neighborhood of but 80% of the silver values. This low result I attribute either to excessively coarse crushing or else that the silver was not all in the form of chloride as stated. From my own experience I am satisfied that not under 95% of the silver present as chloride can ordinarily be recovered by the cyanide process.

In the sulphide ores, argentite or silver glance is the most important mineral. Ores containing it will not give a big extraction with cyanide; nor is it a very desirable substance to treat as it introduces K_2S into the working solutions. Argentite is slowly soluble in strong cyanide solutions according to the following reaction:



The rate of solution is increased by fine crushing and strong solution, while time is the percentage factor. For reasons of economy there is a limit beyond which it is not advisable to increase the strength of solution. Better results will be obtained by using a large volume of solution than a smaller quantity, though the total amount of cyanide contained in both is equal. Sulphide ores from different mines frequently show a wide divergence in their chemical behavior. It is not safe to accept the results of another operator except in generalities. Only a careful examination of the ore in question will demonstrate its fitness for treatment. In treating almost identical ores from different districts I have had extremely variable results. I think this was due in part to slight variations in the chemical composition of the mineral. Argentite when pure has the formula Ag_2S but usually shows the presence of impurities. On certain New Zealand ores as high as 85% of the silver present as sulphide has been recovered. In this case the mineral was in an extremely fine state of division which favored high extraction. With the usual run of ores the extraction will be about 55%. I have shown how potassium sulphide is introduced into the working solutions. It is a very dangerous reagent to have present, as there is always a possibility of its reprecipitating the precious metals in the ore. This undoubtedly happens when the solutions become weak in cyanide. To overcome this tendency strong solutions must be used which will redissolve the metals should they be thrown down. Potassium sulphide also retards the rate of solution. During the past year I have been treating ore containing several ounces of silver sulphide. I invariably get a higher extraction when starting in on fresh solution; the extraction gradually decreasing up to the time when I run my solution to waste. As a general rule ores containing silver sulphide are not adapted to cyanide treatment without a preliminary chloridizing roast. Where the ore contains gold values and the recovery of the silver is of secondary consideration it may be advisable to omit the roasting and leach the raw ore, recovering such silver values as are possible. In the third class of silver ores are included the sulph-arsenides and sulph-antimonides. The principal minerals are pyrrargyrite or dark ruby silver ore, Ag_3S_2Sb , proustite or light ruby silver ore, Ag_3S_2As , and stephenite or brittle silver ore, Ag_5S_4Sb . These are the most refractory silver ores we have to deal with. In the raw state cyanide exerts very little solvent power on them. A year and a half ago I began a series of experiments on these ores and the results were very unsatisfactory as regards extraction. In the very favorable conditions of laboratory work the extraction never exceeded 30% and was frequently as low as 7%, while the consumption of cyanide was abnormally high. By giving the ore a chloridizing roast no trouble was experienced in cyaniding them. When it becomes necessary to roast an ore the greatest skill must be exercised in converting as much of the silver as is possible into a chloride, for the extraction will be just about equal to the per cent chloridized. This will ordinarily vary from 80% to 90%. During the roasting a large quantity of soluble salts are formed, principally chlorides, sulphates, arsenates and antimonates. If allowed to remain in the ore these salts would soon foul the solutions and also injure the precipitation. The only means of getting rid of these objectionable compounds seems to be by a prolonged water wash. This wash water will carry considerable of the values, and to recover them it must be conducted to tanks and the metals precipitated. Zinc precipitation is not practicable in this case and as the wash water usually comes off acid the use of a sulphide as a precipitant naturally suggests itself. Up to this point the operations are identical with those of the old byposulphite lixiviation process. The question naturally arises, why not continue on and use hypo instead of cyanide. This would open up too long a discussion. It is sufficient that the cyanide process has proven itself very much superior to the older method of treatment. Where the ore carries appreciable gold values the use of hypo should not be even considered. There is a class of ore in which I believe the byposulphite process will find its particular field. This is where a silver ore carries copper. The Park-Whitaker process subjects this class of ore to a chloridizing roast, then leaches out the copper chloride with water and applies cyanide. I very



Belcher and Red Rock Mines, Providence, Ariz.

wherein are the Belcher and Red Rock mines—the latter one of the three properties of the United Verde Extension Co. The Red Rock ore is a sulphide, sent to the Val Verde smelter.

Forfeiture and Failure to Contribute to Assessment Work.

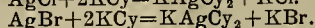
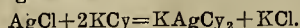
TO THE EDITOR:—Please tell us what can be done with a co-owner in a mining claim when he won't help do the assessment work nor pay his part. You have probably answered this many times, but please answer it once more for a constant reader. Also answer this question: By running a short tunnel we could cut our ledge easily, but it is next to impossible to sink a shaft on the side of a steep mountain. Can we go on another man's claim and run our tunnel? They would certainly give their consent, but would it always be safe?

Amalie, Kern Co., Cal., Dec. 7.

In answer to the first question, Section 2324, Revised Statutes of the United States, provides for annual labor or improvements on an unpatented mining claim to the value of \$100, and additionally says: "Upon the failure of any one of several co-owners to contribute his proportion of the expenditures required hereby, the co-owners who have performed the labor or made the improvements may, at the expiration of the year, give such delinquent co-owner personal notice in writing, or notice by publication in the newspaper published nearest the claim, for at least once a week, for ninety days, and if at the expiration of ninety days after such notice in writing, or by publication, such delinquent should fail or refuse to contribute his proportion of the expenditure required by this section, his interest in the claim shall become the property of his co-owners who have made required expenditures." It is to be noted that 180 days must elapse after the first appearance of the notice of publication.

In order to drive a tunnel through an adjoining

ment of the silver ores which are found so abundantly in the State. In many cases a gratifying success has attended these efforts, but in some instances, owing to the complex nature of the ore, only a partial extraction was obtainable. Some ores are susceptible to cyanide treatment in the raw state, while others require a preliminary chloridizing roast before they become amenable. Silver ores may be divided into three general classes: the chloride, sulphide, and the sulph-arsenide with the sulph-antimonide. The so-called chloride ores include all those in which the silver is combined with chlorine, bromine or iodine. Cerargyrite, $AgCl$, and bromyrite, $AgBr$, are the most important minerals of this division. In some mines they constitute the principal values. These are the most favorable ores for cyaniding. Practically all of the silver will pass into solution, the percentage of extraction depending only on the ability to displace all of the solution by wash water. The silver dissolves with great rapidity according to the following reaction:



These reactions are of a different type than that which takes place in cyaniding gold ores in as much as oxygen does not form a part of it. The great advantage of treating such ores is at once apparent. It also explains in part the rapidity with which the silver is extracted. I might say here that generally when cyanide acts on a metal in combination with another element, oxygen is not necessary to complete the reaction. It is necessary to have either a radical or an acid element to combine with the potassium liberated from the cyanide. If the compound acted upon by the cyanide is capable of furnishing such, then any oxygen present will remain inert. For lixiviation, chloride ores usually admit of very coarse crushing, because of the earthy nature of the

much doubt the advantage of cyanide in this case. Though cyanide will give a high extraction with chlorides it is not economical to treat high-grade ores. The consumption of chemicals may become so great as to make treatment by another process advantageous. Consider the case of an ore carrying 200 ounces silver in the form of chloride. The theoretical consumption of cyanide would be sixteen and one-half pounds per ton of ore treated. From practical experience we know that a very much larger amount would be used up. Such an ore could be treated with greater economy by some other process. Pan amalgamation followed by cyanide would probably be the most satisfactory treatment. It is with low-grade ores, and particularly those carrying gold values that the cyanide process will find its most useful field. To treat these ores successfully requires a high degree of technical skill. The various problems presented by the losses in roasting and water washes, chlorination, elimination of soluble salts and difficulties of precipitation present an inviting field to the metallurgical student.

Austin, Nev., Dec. 1.

A Dry Process for the Treatment of Complex Sulphide Ores.*

By H. L. SULMAN and H. K. PICARD.

The class of ores to which our process is applicable is that in which zinc blende and galena predominate, substantial silver values being also generally present; these, commonly known as "complex sulphide ores," are typified by the Broken Hill deposits. The latter indeed are usually of refractory character, the metallurgical difficulties attending the separation of the lead and zinc being increased by the intimate intercrystallization of the minerals, as well as by the presence of ferrous sulphides, garnet, rhodonite, etc., in considerable quantity.

It is unnecessary to review at length the many attempts to treat these ores, the more important later efforts being well known to members of this Institution; and much valuable information as to the types and values of the Broken Hill deposits is to be found in Mr. Ashcroft's paper.

Before entering into the details of our process, it is advisable to briefly indicate the methods at present employed in recovering the major values from such ores. They are all comprised under the head of concentration, the usual various types of apparatus, both wet and magnetic, being employed. Concentration, indeed, has here been carried to a state of high perfection; but, however ingeniously applied, it can not, owing to intercrystallization and the slight differences in gravity between several of the minerals, obtain sharply demarcated products; hence, it can never be more than partially successful. Even supposing the hulk of the galena to be capable of close separation, a large proportion of the silver would still follow the blende and thus be lost in the subsequent treatment of this mineral for the commercial production of spelter.

Present systems consist, therefore, in the mechanical separation of the largest yield of galena which shall carry only such blende as is incapable of giving rise to serious smelting trouble. These lead (silver) concentrates are smelted in the usual manner and constitute the only product of commercial value derivable from the ore. The other by-products are zinc middlings, siliceous tails and slimes; each is more or less contaminated with all the various minerals of the original ore. Thus, while the galena concentrates carries several per cent of zinc, the zinc middlings similarly hold large amounts of lead and silver, but are nevertheless of little or no present value; samples which have come before us have averaged 25% to 27% of zinc, about 12% of lead and ten to twelve ounces of silver. The slimes are more or less representative of the whole ore hulk, and may even be somewhat enriched in zinc and silver; large parcels dealt with by us have been as high as 25% zinc, 24% lead and twenty-six ounces silver; but the general run is lower, say, 20% to 22% zinc, 17% to 19% lead and fifteen to eighteen ounces silver per ton. Slimes are also at present practically valueless. Chairmen of the various mines are apt to describe these middlings and slimes as a reproach to the metallurgist, and to picture to their shareholders visions of the potential wealth which these huge accumulations represent, realizable when once the process for their successful reduction shall be discovered.

At the various Broken Hill mines reduction work is now limited to concentration, the lead concentrates being shipped to coastal smelting works, where they are reduced to hulkion with other purchased ores. Net recoveries do not probably exceed 60% to 75% of the lead and 55% to 65% of the silver; with the exception of small particles shipped to Europe periodically, no zinc is recovered, though on this point it is difficult to obtain figures.

The economics of the problem have not greatly altered from those outlined by Mr. Ashcroft in 1898, when he showed that, with the then metal prices, a profit of 15s was all that was realizable from an ore value of some £9 per ton. Since that date it is true that considerable fluctuations in prices have occurred. Zinc rose to £28, but, though

this was a useless boon to Broken Hill, lead appreciated to £16, and for a while permitted of good dividends. This period was shortly succeeded by a still more serious fall, lead receding to a lower level in 1901 than had been known for many years, while silver has recently touched its lowest recorded price. Indeed, in 1901 all the Broken Hill mines, with the exception of the Proprietary and Central Companies, were for a while shut down. Although both lead and zinc have exhibited a slow rise of late months, the general outlook cannot be considered much brighter than Mr. Ashcroft had to face in 1898. Nor do the ore supplies show any tendency to increase in value. An average of 17% lead, 24% zinc, and thirteen ounces silver per ton may now be regarded as a general type of available material.

The greatest advances of late years have been in the direction of magnetic separation. Various types of magnetic concentrators are now under trial and in use at the different mines, by which a closer separation is possible, and the further concentration of the middlings into what may be considered a very inferior type of zinc blende ore can be effected. The inferiority of these zinc concentrates lies in the continued presence of considerable percentages of lead, and frequently as much as one-third the silver originally held by the ore.

By one type of magnetic concentrator known to us the galena and quartz are obtained together, a more or less impure blende as the second product, and the hulk of the rhodonite in a third. The lead then undergoes wet dressing to separate the silica. Starting with 100 tons of ore, about 40 tons of blende product are obtainable, assaying 40% to 45% of zinc (about 70% to 75% of the total in the ore), about 7% of lead, and from ten to twelve ounces of silver. This product is bought in limited quantities by European smelters, but we are unable to say whether they pay for the silver or exact a fine for the lead. In this country nothing would be paid for the silver, and it is doubtful if the English zinc smelter would under any circumstances treat an ore containing 7% of lead. It is probable that on the continent this product is mixed with pure blende ore in order to reduce the lead to a possible smelting charge. Sixteen to twenty tons of galena concentrates are produced after water dressing, the first product containing about 75% of the original lead and 45% to 50% of the silver. The lead product is, of course, subject to the usual smelting losses, which may vary from 7% to 10%.

A second system, investigated rather with the idea of obtaining the richest mixed galena-blende product for our own use than with the object of effecting the sharpest possible separation of each mineral, was able to produce from zinc middlings (assaying 30% zinc, 8½% lead and twelve ounces silver) a mixed concentrate amounting to 65% of the original ore weight, and carrying 39% of zinc, 11½% of lead and fourteen and one-half ounces of silver, equal to total recoveries of 85½%, 87% and 81%, respectively. This was obtained by the mixing of a more with a less leady concentrate.

The foregoing is a brief sketch of the recoveries now obtainable in Australia, and given to indicate the possible scope of invention for remedying the unsatisfactory results realized even by the best systems of concentration.

In the cases of many huge deposits of complex ore known to exist in other localities, but hitherto unworked, present Australian methods would not necessarily be followed as preliminary steps in our own or perhaps other processes. The Broken Hill products and accumulations are the outcome of evolutionary concentration methods, but in many instances complex ores are capable of direct reduction without the need of mechanical separation, or at most but that of barren siliceous gangue if desirable.

In our search for a suitable reduction scheme we desired to confine our attention to dry processes in order to avoid the apparently insuperable difficulties attendant upon all wet methods. When it is remembered that the weekly production of ore from Broken Hill mines amounts to some 20,000 tons, and that the maximum density of zinc sulphate liquors practically allowable cannot reach much over 20%, the task of dealing with the huge necessary hulks of solution, and of leaching, filtration, concentration and precipitation, operations on such become appalling. Even then (electrolysis being as yet unsuccessful with aqueous zinc solutions) the result is only a product requiring dry distillation. Indeed, it becomes evident that the difficulties of wet recovery processes only really commence when the solution of zinc or other metal has been effected.

Dry processes are, of course, no novelty, as witness the efforts of the Smelting Corporation, of Ellershausen, Armstrong, Angel, Claus and many others in this direction. But we believe we are correct in saying that hitherto all dry processes have started with the intention of recovering the lead and silver in the first instance, while obtaining the zinc as a volatilization, or as a slag, or other residual product, for subsequent retreatment. We cannot, however, include in this category the recently introduced Phoenix process, which, if alone from the daring ingenuity displayed, is worthy of a class to itself.

In fact, zinc has always been considered as the objectionable element in the ore, and the efforts have almost invariably been towards its early elimination, with the hope—never yet realized—of a subsequent

economic recovery. The reasons for this attitude are easy to discern. These ores have always been considered primarily as lead ores, while those interested in the zinc industry who may have directed attention towards such have condemned them at once as unsuitable for treatment in zinc retort furnaces, owing to the fatal presence of lead in any product obtainable by dressing.

The difficulties in dressing leady zinc ores are shortly these: Foremost comes the destruction of the retorts by the reduced lead, this occurring mainly during the stirring out of the seconds from the pots, whereby the metallic lead is oxidized to litharge, with the inevitable result of the slagging up and holing of the retorts. Even could this be overcome, it is found in ordinary practice that lead tends to volatilize with the metallic zinc vapors in such quantities as to materially damage the spelter produced. Finally, if lead were capable of complete elimination from the ore, we would still have the question of the silver to deal with, which, as we have shown, largely follows the blende, and would, in the usual routine, be lost both in the seconds (similar to the lead) by partial volatilization in zinc vapors.

(TO BE CONTINUED.)

Coal Pocket Elevator and Conveyor.

The illustration herewith presents a system of coal-handling machinery of modern and improved type for coal pocket situated inland, where the supply has to be taken from railroad cars.

The illustration was taken from a recent installation for Van Horson & Bertine, Mount Vernon, N. Y., and represents a type of elevator known as "continuous huckets," feeding from a pit under the track direct to the turret of coal pocket, and at that point discharging into a scraper conveyor, by which means



Coal Pocket Elevator and Conveyor.

the coal is carried to any one of the different storage bins and discharged through a gate.

The simplicity of this form of machinery and its low cost are important considerations, while at the same time the efficiency is high and the loss by breakage reduced to a minimum.

The type of elevator shown and described is one in which the coal is not thrown by centrifugal force when discharging at the head, but simply spills from the huckets, and, with a short drop, is lodged in the conveyor and carried along to the particular bin for which it is intended.

This apparatus was installed by the Jeffrey Manufacturing Co., whose works are at Columbus, Ohio.

Various modifications in the forms of this machinery enables the manufacturers to adapt it to a wide range of work, and when plans or sketches are submitted estimates and complete drawings will be furnished to intending purchasers.

THE requirement of annual labor on unpatented mining claims is not optional with claim owner. It is imperative if the locator wishes to hold the claim.

*Transactions of the Institution of Mining and Metallurgy.

A Mexican Mill and Patio.

Many millions of ounces of silver and gold have been recovered from ores in Mexico during the past three centuries by primitive methods and slow processes. While the arrastra and patio are still a marked feature of metallurgical operations in Mexico, many changes are taking place. Old Mexican methods are giving place to modern American prac-



Mill and Patio, Etzatlán, Jalisco, Mexico.

The Pride of the West M. & M. Co., Washington, Ariz.*

Written for the MINING AND SCIENTIFIC PRESS by JESSE SCOHEY.

The Pride of the West M. & M. Co., operating at Washington, Santa Cruz county, Arizona, is one of the unique companies of Arizona, from the fact that they are operating on a most complex ore and are

breaker and rolls falls into a 50-ton storage bin, from which it is automatically fed by an improved feeder of the plunger type, devised by M. H. Clagett, into a chute leading to the bottom of the second 12-inch elevator, identical with the first, but discharging into 36x60-inch, 12-mesh steel wire trommels. The oversize from these goes through dividers to two 14x37-inch Davis belted rolls running 120 revolutions, and discharges into the same 12-inch elevator by which



Old Arrastra, Etzatlán, Jalisco, Mexico.

tice and many old mines are again being operated under the direction of American engineers. The two accompanying photos are typical representations of an old arrastra and a patio in its walled enclosure at Etzatlán, State of Jalisco, Mexico.

Topography of a California Oil Field.

The two accompanying halftones will convey better than a written description an idea of the topography and general features of the oil-bearing territory

making three distinct commercial products in one milling operation that comprises dry crushing, roasting, magnetic separation, wet concentration, drying and smelting.

The property was developed and the treatment evolved by A. R. Wilfey, president of the company, who is prominently identified with ore treatment from his invention of the Wilfey table. The company is a Colorado corporation, with John S. Cary vice-president, Herbert E. Fiske secretary, and A. R. Wilfey, John S. Cary, Frank L. Smith, Emerson

they are fed.

The undersize from the 12-mesh screens, comprising all the fines of the ore, the fines produced by the rock breaker, the coarse rolls and the fine rolls, is accumulated in four bins holding about 100 tons, although in continuous operation the ore falls directly through these bins and onto a 16-inch, 4-ply rubber belt conveyor 80 feet center to center, running 113 feet per minute and carrying the ore through the second floor of the mill, where it discharges into the hoppers of a 12x120-foot Holthoff-Wetthey calcining



Oil Formation, San Emidio Canyon, Cal.



Oil Formation, San Emidio Canyon, Cal.

about San Emidio canyon, Kern county, Cal. These hills of sandstone and shales are rounded and usually covered with a thicket of brush, but in some portions of the district the slopes are abrupt and even precipitous.

Power in South Africa.

It is reported that the industrial conditions in South Africa demand the development of a large amount of power, and, as a matter of course, water power is preferred. This will develop electrical power which can be transmitted to any point within the range of possibilities. There are numerous large waterfalls on all the large streams of Africa, particularly on the Congo and its affluents and on the Zambesi river. On the latter stream the Victoria Falls is the largest in the world—larger than Niagara. It is about a mile wide and 420 feet high. Even in dry seasons the water is from 2 to 3 feet deep at the crest of the fall.

FUEL can be economized by putting a damper in the smokestack, and a further saving can be effected by passing water through a cylinder heated by the exhaust steam from the engine. It never pays to pump or otherwise force cold water into a steam boiler.

Gee, Herbert E. Fiske, Robert J. Cary and John J. Broughall as directors. The present operations are controlled at Washington by Jesse Scohey, general manager, and Herbert M. Clagett, superintendent.

The original claim of the company was the Pride of the West, acquired about 1896, and is now one of a group of nineteen claims, showing a prominent mineralization along a granite and limestone contact, with intersecting porphyry.

The milling ore has an average composition of 5% copper, 11% zinc, 7% lead, 20% garnet, 30% silica and 2% lime, and is mined from large lenses, raised through a main incline to the main tunnel level, and from there trammed to the head of a gravity skip, which lowers the ore to the main ore bin of the mill. This bin is also fed by teams hauling from the different workings not connected with the Pride incline. The ore is fed by hand into a 10x20-inch Blake crusher and elevated by a 12-inch, 8-ply rubber belt elevator with cast malleable cups to a 36x80-inch, 4-mesh steel wire cloth trommel, running thirteen revolutions, from which the oversize returns by gravity through a storage bin to a 16x36-inch Davis belted roll running eighty revolutions and discharging into the same 12-inch elevator above mentioned as relieving the rock breaker. The undersize from the rock

furnace. The hearth of this furnace was specially constructed under instructions from A. R. Wilfey for two distinct duties. The crude ore first falling from the hoppers onto the hearth is rahlled a distance of 78 feet, with a chain speed of 57 feet per minute, past two staggered fireboxes fired with wood, consuming seven cords per day of twenty-four hours. Here the hearth is broken for 10 inches, allowing the roasted ore to fall to the cooling hearth below, to be cooled and rahlled back to the same end of the furnace whence it was fed. The remaining 42 feet of hearth is used for roasting copper concentrates previous to smelting, and is fired by the third firebox, consuming four cords of wood per day of twenty-four hours, the spent flame from which continues along the hearth and assists in roasting the crude ore. This latter part of the furnace is fed from an 8-inch, 4-ply belt conveyor, 92 feet center to center, running 85 feet per minute, directly over the furnace, and carries the copper concentrates made by the magnetic separators. The concentrates are here roasted to 7% to 10% sulphur and discharged into bottom-discharge ore cars and trammed to the smelter.

The roasted crude ore is discharged from the cooling hearth of the furnace onto a Wilfey shaking conveyor with steel pan 14 inches wide by 30 feet long and carried to a 6-inch rubber belt elevator with cast malleable cups running 302 feet per minute and ele-

* See illustrations, page 334.

vated 37 feet to a cooler, devised by H. M. Clagett, consisting of a series of connected pans 36 inches wide, operated by a Wilfley movement, whereby the ore is spread to a thin film and exposed to the air in a thin, falling stream as it is shaken from one pan to the other. This machine tends to reduce the temperature of the roasted ore to the lowest possible point, as the magnetic susceptibility of the minerals varies inversely with the temperature.

From the cooler the ore is taken by a second Wilfley conveyor specially constructed to cut out variable proportions of ore, and is divided and distributed to four bins that feed directly each to a Wetherill 4-pole magnetic separator. These four machines perform the same duty, each handling twenty-five tons of crude ore per day. All poles carry 110 volts. The first two poles of all machines consume three amperes, while the last two require five amperes. The main 16-inch feed belts run 95 feet per minute; the first two cross belts run 356 feet per minute, the last two 276 feet per minute. All four poles perform the same duty, lifting the roasted chalcopryite and iron and discharging tailings carrying all the lead, zinc, garnet and silica.

The chalcopryite falls from these machines to an 8-inch, 4-ply rubber belt conveyor, running 69 feet per minute, discharging into the hoot of a 6-inch rubber belt elevator that discharges onto the 8-inch conveyor previously mentioned as running directly over the roaster and discharging into the further half.

The tailings from the magnets discharge into a bath of water, from which radiating launders carry the pulp to five standard Wilfley tables, where the lead and zinc are concentrated at the head of the table, while the zinc and garnets are discharged as middlings. The silica and some garnets are discharged as tailings into a concrete sluice running through the center of the table room.

A Wilfley shaking conveyor runs the length of the table room along the head end of the tables, and receives into one compartment the lead and zinc concentrates, and into the other the zinc and garnet middlings. These latter discharge into the hoot of a 4-inch rubber belt elevator, equipped with special cast copper cups, which elevates and distributes the middlings to two Wilfley tables that concentrate the zinc at the head end and discharge a proportion of the garnets into the tailings sluice. The zinc falls into the compartment of the shaking conveyor that carries the lead and zinc, and all are carried forward to a second 4-inch rubber belt elevator, with cast copper cups, which discharges to two more Wilfley tables. Here the lead is concentrated to 70%, with from 100 to 120 ounces silver. The zinc-garnet tailings are in this instance sluiced to a special drag box that is equipped to drag the moist mineral that settles to the bottom out from the water and up to an altitude that enables it to fall by gravity to a dryer, using exhaust steam as a heating medium. The water from the drag box overflows into the main tailings sluice.

The dryer consists of a pan 30 inches wide by 60 feet long, upon which the wet ore falls at one end and is rahlled forward by staggered rahlles traveling 35 feet per minute, and discharging the pulp—dry—into the hoot of a 6-inch rubber belt elevator. The ore is here raised to the second floor of the mill, where it is screened over a 12-mesh cloth attached to a Wilfley shaking conveyor. The oversize is waste, and the undersize is dropped into the 10-inch pan of the conveyor and carried in a divider into two bins, each feeding a 6-pole high-power Wetherill magnetic separator.

These two machines perform the same duty, each on fifteen tons of the zinc-garnet tailings. They carry 110 volts on all magnets. The first two poles are set to four amperes, the second two poles to ten amperes, and the last two at twenty-five amperes. The main feed belts run 31½ feet per minute, while the cross belts run 218 feet, 187 feet and 171 feet per minute, respectively.

The first two poles lift any chalcopryite that may have escaped the original four machines; the second two poles lift the garnets that were concentrated with the zinc, and the last two poles lift the clean zinc. The tailings from these machines are an inconsiderable amount, but consist of any silica or lead that may have escaped the concentrating tables. This material is then rerun when a sufficient quantity has accumulated.

The zinc, 50% pure, is shipped to Belgium and the lead concentrates are shipped to Philadelphia. The copper concentrates, after being roasted and delivered to the smelter, are combined with an equal weight of crushed carbonate ore and stored in three charging hoppers over a 14 foot, 6-inch by 29-foot, 6-inch reverberatory smelter. This furnace until quite recently used wood exclusively as fuel, and required nine cords of black oak and eight cords of juniper per twenty-four hours. The wood having become scarce, fifteen cords of black oak are now used per day, with six barrels of California crude oil. The oil flows by gravity in three small streams through holes in the arch of the firebox and falls directly on the burning oak. This furnace smelts six charges of seven tons each, or forty-two tons of ore per day, into 60% matte, which is at present being shipped to New York.

A scarcity of water necessitates the most careful use of all available water. Seventy-five tons of tail-

ings from the magnetic separators are washed over Wilfley tables with a consumption of only 6000 gallons per day, which represents a loss of only 2% of all the water required. This is in the table tailings, which are discharged with 25% moisture. The accumulated table tailings are elevated by a 12-inch rubber belt, equipped with special cast copper cups, and discharged into a drag box designed by Jesse Scohey for this work. The box is an inverted pyramid 5 feet deep, with a base 7x10 feet. There is a false hack along the 7-foot side that receives the pulp from the elevator and carries it down to the bottom of the box, delivering it under a 12-inch pulley, over which runs a belt equipped with cast copper drags. This belt runs 30 feet per minute and slowly drags the settled pulp up one edge of the pyramid at an angle of 35°, allowing the contained water to drain back, and discharges the moist pulp into a small bin, from which it is wheeled to the dump. The box has a settling surface of 40 square feet and is not disturbed by the belt, which is, for the most part, under the water at the bottom of the box. The settled water is drawn off over a haffleboard 6 feet long at the wide side of the pyramid receiving the pulp.

The slimes water for a time defied all attempts at settling. It was led into a shallow tank 14x19 feet by 2 feet deep, divided into three compartments, so that two were used while the third was being cleaned. The two tanks in use formed a settling surface 6 feet wide by 29 feet long, but as the water after passing through this was still too foul for use it was led into an additional settler consisting of a tank 16 feet in diameter by 16 feet deep. The pulp was fed into a 12x12-inch closed chute that discharged within 2 feet of the bottom of the tank. The clear water was drawn over the top of the tank into a launder surrounding the tank on the outside. A small stream of thick slimes was drawn continuously from the bottom of the settler. The water overflowing the 50-foot periphery is absolutely clear, and is drawn into a subsidiary tank filled with old iron, which precipitates the copper sulphate held in solution.

It was found that after washing the ore some of the roasted copper escaping the magnets was taken up by the water as copper sulphate. This attacked all the iron parts of the table, and especially the iron cups of all elevators, so that, as above noted, all wet elevators and all parts exposed to the water are now constructed of either wood, rubber or copper.

The plant is operated with three horizontal tubular boilers, supplying a 12x24x30-inch tandem compound Allis-Chalmers engine. There is a 40 H. P. slide valve engine used as an auxiliary in case of shut down to supply the dynamos for lighting. All exhaust steam from every pump or engine at the mill, or hoists at the mines, is connected with the condensing system. This is made up of three units, all open one into the other, but all discharging under water into the tanks from which the boilers are supplied. The steam dryer condenses about 10 H. P. in drying twenty tons of ore per day. The air condenser, consisting of 2826 square feet of exposed surface, contained in a cooling tower 50 feet high to create a draught, condenses about 15 H. P. The remaining exhaust steam is carried through a 10-inch galvanized pipe to the main water supply tank above the works. This tank is of iron, 50 feet in diameter by 5 feet deep, and is equipped with 750 square feet of condensing surface in 2-inch pipe coiled in the bottom of the tank. All water used in the plant is pumped into this tank from wells 1½ mile from Washington. The tank is 350 feet above the mill, so that an ample head and supply are maintained in case of fire. The plant is fully equipped with fire hose located at such points as will command all parts.

Mexican labor is employed in every department, and is found efficient, intelligent and reliable. The company maintains a well-stocked department store, directed by H. R. Renshaw, which issues all supplies to the mines, mill and smelter, and also trades with the people of the town and the surrounding cattle districts. Washington is reached by stage lines from Patagonia or Nogales.

Washington, Ariz., Dec. 2.

Magnetic Concentration of Ore.

In the process of concentration by means of electrical magnets the ore is delivered by an adjustable chute between two magnetic poles, the upper one of which (the north pole) is rotated. As the ore arrives in the magnetic field the permeable particles are attracted by the north pole and are carried around by it into zones of progressively diminishing intensity until the centrifugal force imparted to the particles overcomes the magnetic attraction and they fall into collecting chutes, being classified according to their magnetic properties. The non-magnetic material falls directly into a chute close against the lower pole. This arrangement is claimed to have the advantages of dispensing with belt carriers, which weaken the magnetic field, and also of permitting the use of small magnetic fields and very narrow air spaces, thus minimizing the loss of energy and making it possible to attract feebly magnetic particles by a very weak current. The rotating pole being the only moving part of the machine, wear and tear is very small. In separating blende and siderite from the Upper Harz,

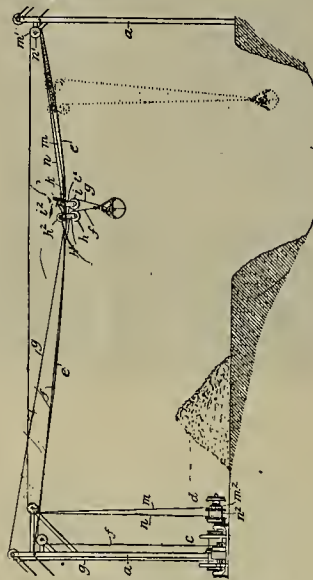
the grains being of 0.5 millimeter size, 98.7% of the zinc has been recovered. With dolomitic Silesian blende of 2 to 3 millimeter size, the recovery was 91.8%, which was increased to 93.5% by reducing the grains to 2 millimeters. In treating ore from Broken Hill a yield of 81% of the lead and 69% of the zinc was obtained.—Electrical Review.

Mining and Metallurgical Patents.

Patents Issued December 2, 1902.

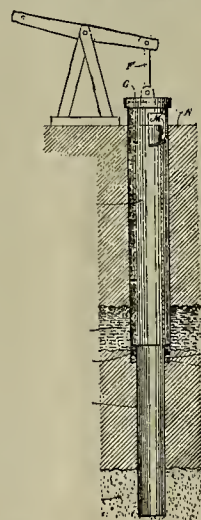
Specially Reported and Illustrated for the MINING AND SCIENTIFIC PRESS.

HOISTING APPARATUS.—No. 714,701; C. W. Hunt, West New Brighton, N. Y.



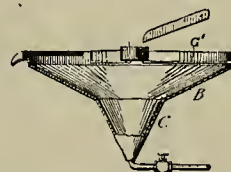
In a hoisting apparatus, combination of hoisting ropes, separable guides for ropes respectively and drums connected respectively to guides to effect movement thereof, one drum having portions of different sizes whereby the rate of movement of one of guides with respect to other is varied during movement of both guides.

PROCESS OF SHUTTING OFF WATER IN DRILLED OIL WELLS.—No. 715,141; W. Piotts, Whittier, Cal.



Method shutting off water in drilled oil wells, which consists in drilling larger hole to short distance below water-bearing stratum which it is desired to shut off and casing same; then drilling smaller hole in bottom of larger hole down into the oil sand and putting in casing in smaller hole; after which larger casing is loosened and kept moving up and down; feeding packing material between casings and tamping packing material around inner casing below water-bearing stratum by movement of outer casing; then feeding between casings a puddling material and tamping puddling material around inner casing upon packing material by movement of the outer casing.

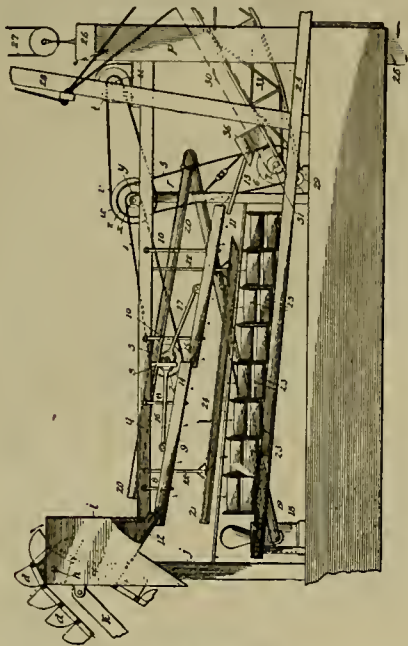
SETTLING TANK OR DECANTING VESSEL.—No. 714,822; J. Randall, Deadwood, S. D.



Settling tank consisting of body having vertical side and bottom formed of slopes, different inclinations, provided with central outlet, side having cutaway portion forming an overflow lip, launder en-

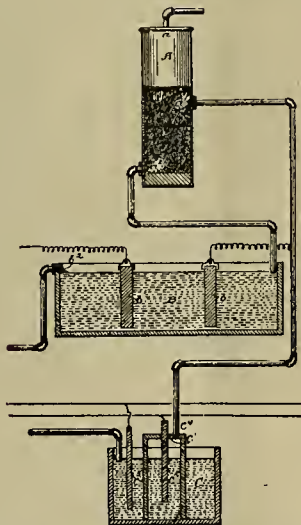
circling lip and provided with discharge spout, baffle plate of cylindrical form connected by strips to upper portion of side and extending into tank below top nearly to lower edge of side, and pipe leading from central outlet.

ORE CONCENTRATING AND DREDGING APPARATUS.—No. 714,755; A. B. Stetson, Milwaukee, Wis.



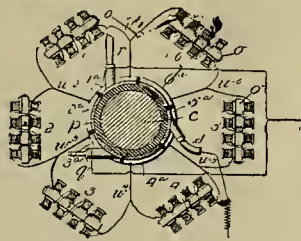
In an ore concentrating combination of plurality of longitudinally inclined shaking screens; intermediate shaft and eccentrics adapted to simultaneously reciprocate screens in opposite directions; distributing pan provided with foraminous bottom, below series of screens; deflecting plate with oppositely inclined sections below distributing pan; series of concentrating surfaces each side of deflecting plate; series of longitudinally extending spray pipes above shaking screens; conveyor for receiving and carrying away heavy waste material from screens.

PROCESS OF ELECTROLYTIC SEPARATION OF COPPER AND NICKEL.—No. 714,861; D. H. Browne, Cleveland, Ohio.



In the art of copper separation, process which consists in treating copper-nickel matte to form copper-nickel alloy free from sulphur; treating alloy with chlorine and solvent for cuprous chloride.

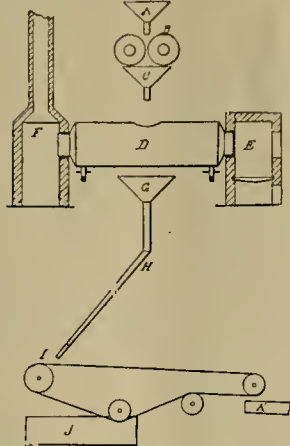
MAGNETIC SEPARATOR.—No. 715,160; C. Scholl, Goppingen, Germany.



In magnetic separator, rotary separating drum in combination with series of electromagnets for producing partial magnetic field on surface of drum; rotary sectional current distributor ring; two brushes for supplying current of one polarity and so arranged as never to impinge against adjoining distributor sections, third brush impinging against an intermediate section and arranged to supply current

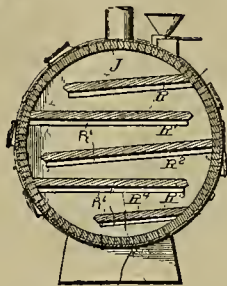
of opposite polarity, connections between coils of electromagnets and sections of current distributor, whereby current is fed only to portion of coils; and portion of surface of separating drum is thus constantly non-magnetic.

PROCESS OF OBTAINING METALS FROM THEIR ORES.—No. 714,914; N. S. Keith, Arlington, N. J.



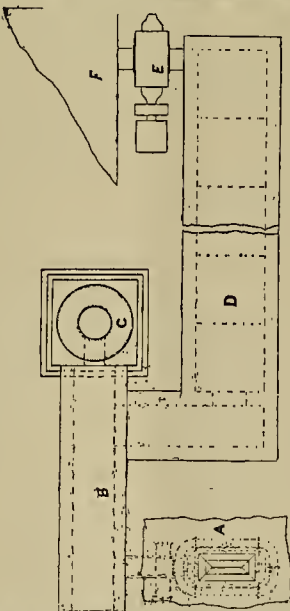
Process of separating metal from ore and gangue, which consists in grinding ore and gangue with carbon; heating ground mixture in open furnace, containing atmosphere of reducing gases, to temperature of fusion of particles of ore only, and submitting thus treated mixture to mechanical concentration to obtain the metal.

ORE ROASTING FURNACE.—No. 715,080; A. C. Johnson, Baltimore, Md.



In combination with cylindrical shell, cylinder heads having flanges extending over shell bolts fastening heads together, tiling within shell, shelves arranged in reverse directions and inclined blocks projecting from tiling to support shelves, shafts projecting from ends of furnace, pipes for conveying gases from furnace, and means for rocking latter.

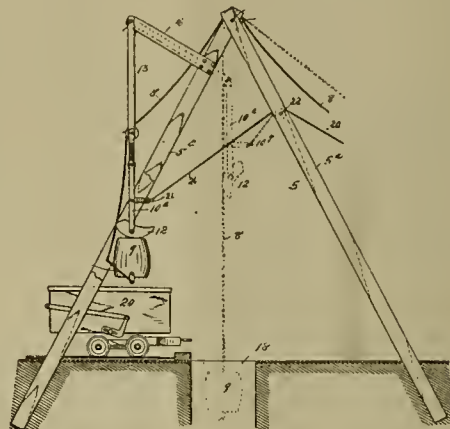
EXTRACTING METALS FROM COMPLEX OR SULPHIDE ORES.—No. 715,024; J. C. Clancy and L. W. Marsland, Sydney, New South Wales, Australia.



Process of extracting and recovering gold, silver, lead, zinc and other metals from mixed or complex sulphide ores consisting essentially in following successive operations, heating ore with addition or admixture of lead sulphate in a cupola or blast furnace so as to convert required amount of lead and whole of zinc and other volatile metals contained in mixture more or less wholly into fume, spraying dilute sulphuric acid upon fume and gaseous products of decomposition to convert fumed metallic oxides into their corresponding sulphates, recovering lead sulphate used for mixing with ore and zinc and other

volatile metals from sulphates deposited in first named or fume chamber, recovering metallic contents from residue remaining in furnace by smelting.

BUCKET DUMPING APPARATUS.—No. 715,228; W. R. Wilcox, Saratoga, Wyo.



In bucket-dumping apparatus, combination with suitable frame, bucket provided with depending ring attached to bottom, device suspended on frame and composed of two separated arms, part connecting arms and bowed outwardly therefrom on one side, device pivoted between arms at lower extremities, provided with hook, bucket provided with ring adapted to automatically engage hook of device as bucket is lowered to position thereon, pulley located at upper extremity of device and adapted to be engaged by bucket-hoisting cable, link connecting upper extremity of device with frame beyond plane of bucket-hoisting cable.

The Most Economical Engine.

What type of steam engine will supply power most cheaply? The scientific man, and the theoretical, said the London Engineer, in a recent discussion of this question, will naturally jump to the conclusion that the engine which uses least steam per horse power per hour will best satisfy the conditions. But the steam user has only too good reason to know that the question is much too complicated to be answered in that way. Taking coal to cost one-tenth of a penny per pound or a little over a sovereign per ton—a reasonable price for steam coal—it will be seen that if 1000 I. H. P. is obtained for an hour with 2000 pounds of coal the cost is 17s 6d. A reduction in the consumption amounting to the not inconsiderable figure of 14% would represent a saving of but half a crown. It is in no way certain that in the long run, of two engines, one using 14% less steam than the other the first would be the better engine to have. It might be or it might not be.

There are, however, certain broad principles which will serve to guide the engineer. It will usually be found that high economy means, if not complication, at all events an increase in the number of parts, and a high steam pressure. To these things there is no objection so long as it is fully understood that they demand superior material and very excellent workmanship. The highly economical engine must, therefore, be comparatively an expensive engine. If it is not expensive at first, it is sure to be costly in the long run. Thus, for example, with high-pressure steam and a high piston speed, it is essential that the cylinder liner metal, particularly if the engine is horizontal, shall be as hard as is compatible with boring. This means that the liners will cost a good deal of money. If soft metal is used, the result will be serious. Furthermore, it must never be forgotten that the primary condition of working is that the engine shall never cease running until the engineer in charge stops it. That is to say, it must not get hot bearings or break down in any way. Now, engines with complicated valve gear are not invariably trustworthy in this respect. They are not trustworthy at all unless they are extremely well designed, made and maintained. These and various other considerations all point to the one end. The very economical engine must be a very fine piece of mechanism, and it must be taken in charge by competent men. It is the old story of the astronomical regulator and the kitchen clock over again.

If, now, the engineer is told that he can have the economical engine for the same price, or nearly the same price, as the engine of a simpler type, he will do well to regard this statement with suspicion. It is quite possible to build a cheap engine which will give a very high result for a short time. In the end it will prove a weariness to the flesh of everyone who has to do with it. On the other hand, the first cost, and the other costs involved in the purchase and use of a very economical and beautiful engine, may be so great that the saving effected in fuel will not compensate for the augmented outlay. Anyone ought to see at a glance that at this point we are brought face to face with the cost of coal, and thus an engine which might be highly desirable in one place where fuel may be very dear might not be at all the best in the center of the coal fields.

Mining Summary.

Specially compiled and reported for the
MINING AND SCIENTIFIC PRESS.

ALASKA.

NOME.

(Special Correspondence).—There are 2500 people left in Nome to winter after the exodus has ceased. The Corwin will take seventy-five to-morrow. Everybody remaining here is busy preparing for extensive winter digging, not only in the Nome district, but also in the Solomon River, Ophir Creek and even the Kougruk districts. Besides, work is being pushed on the different ditch systems, to get supplies and lumber on the snow to their destination before the severe cold shall make work more disagreeable. The quartz mill of Mrs. Lane has been landed at the mouth of Solomon and is being hauled on sleighs to Big Hurrah creek; the contract for the erection of the stamp mill calls for the same to be completed and in running order by June 1, 1903. The shaft is now 65 feet deep, at which depth the ledge is 8 feet wide and seems to be widening. There is \$100,000 ore in sight. Solomon river benches are being opened up and preparations are being made to work them this winter season. On Nos. 9 and 10, below Discovery, a good-sized pay streak has been discovered that runs as high as 25 cents to the pan. The lower part of Solomon river has also some new discoveries.

On Mystery creek, tributary to Shovel, are at present six camps, all of which intend to do winter work. On Nos. 5 and 6, and the benches off Nos. 7 and 8, above, have some pretty good indications for a good pay streak.

Ophir creek, tributary to the Neukluk river, is going to be a good producer the coming winter season.

The benches have proven the last summer season to be as good as the creek, and a number of camps will be working in that creek. C. D. Lane is constructing a flume from the head of Ophir to No. 15 above; the hauling of lumber to that place will occupy a large force of men all winter.

Council City, at the mouth of Ophir creek, is a typical prosperous mining camp. Everybody seems to have had a good season; money is plentiful, and business men, as well as property owners, are looking forward to a good winter season.

There is a new ditch in course of construction from the head of Nome river to Buster creek, on the left limit of the river. Great beds of gold gravel have been discovered on the blislands at the head of Nome river, which it would not pay to handle with the crude methods of pick and shovel, but which will pay immensely if worked by hydraulic methods.

Peeluk creek benches are being worked; several shafts have been started the last few weeks. Otter creek benches on both sides of the creek are being opened up. On the Jefferson claim a body of wash gravel 20 feet deep has been found, and the probabilities are that a big dump will be taken out before next spring. A defined pay streak of beach gold has been traced from No. 3 on Peeluk creek, across Martin creek to Otter creek, and thence to Hastings creek, and many mine owners contemplate to work on this streak the coming winter.

A body of pay gravel on the benches off No. 3 above, on Bourbon creek, at a depth of 75 feet, has been found, which will average 3 cents to the pan.

Dexter and Anvil creeks have the usual force of men employed on the benches, and are all doing well.

The latest strike is reported from the given-up Kougruk. On Dahl creek, No. 2 above, Mr. Olsen, brother of the San Francisco grocer, has a large body of pay—\$8000 reported on one day's cleanup—and also that he had one pan of dirt which went as high as \$220; that the gold can be literally seen in the frozen ground.

Good reports come from the Inmatchuk river, a tributary to Good Hope bay. People returning from that section have all good-sized pokes.

Nome, Nov. 9.

The Alaskan-Rodman Bay Co., of London, has bought nine claims in the Dewey group of gold mines on Rodman bay, with stamp mills, equipped with water power and electricity, and 7 miles of railroad for \$297,500.

Work has been resumed on the Kensington tunnel at Seward. T. S. Nowell says the work may be let by contract.

At the Ebner mine, in Silver Bow basin, ore is broken to feed the mill for more than a year, and thousands of tons in reserve in the mine. It is reported that fifty stamps are to be added to the recent order for a mill.

The Alaska-Juneau G. M. Co. have secured a millsite in Silver Bow basin and

arrangements are being made for 100 stamps. It is reported that the old mill will be moved to the new site and 100 stamps added.

ARIZONA.

COCHISE COUNTY.

A. Bauer of Bisbee is developing a copper prospect in the Solomon Springs district. The shaft is wholly in ore, its width not having been learned.

The gallows-frame on the new shaft of the Bisbee West is in place, also the new engine. An addition of twenty men will be made. General Superintendent Dwight says the shaft will be sunk 1000 feet.

The mines of Tombstone are being unwatered and rehabilitated by the Tombstone Con. Mines Co., Ltd., under the supervision of the Development Co. of America, whose board of directors is composed of B. P. Chessey of Boston, R. A. Alger of Detroit, N. K. Fairbank of Chicago, F. M. Murphy of Prescott, Ariz., and others. The Tombstone Con. Mines Co., Ltd., was organized last year, and has bought up all of the productive mines of the district, comprising 97% of the ore output prior to the suspension, at a cost of nearly \$10,000,000. It has hauled from Fairbank on the railroad to Tombstone, 8 miles, between thirty and forty carloads of machinery, including four boilers 200 H. P. each, weighing twenty-five tons each. Its pumps were made by the Prescott Pump Works of Milwaukee. The hoist, 79 feet high by 39 feet square, sets upon granite piers. The pumps are more than double the capacity of those installed in 1886, which lowered the water with ease.

At the Lowell mine, near Lowell, pumps will be installed and another compartment is being added to the double compartment shaft. They are raising from the level upon which the pumps will be put.

The Calumet & Arizona Co. is shipping ore to Douglas, where their smelter has been blown in. A number of automatic, self-dumping ore cars have been put on between the mine and Douglas.

GRAHAM COUNTY.

The Era says the Chase Creek C. M. Co. has incorporated to operate property in the Greenlee district. They have secured forty-four claims, all but four of which lie in the belt between the Longfellow mine, and the properties of the Clifton Con. and New England C. Co.'s holdings on Chase creek. The main tunnel will be started from the creek, and others will be run farther back. I. N. Stevens is manager.

P. F. Crowley is shipping ore from the Antietam claim, near Metcalf. The shaft, 7x9 feet, is in ore. At 70 feet he ran a drift 48 feet in ore which averages 10% copper and some gold.

Sixty-five tons of 25% copper ore were shipped from the Standard copper mines last week to the smelter.

Manager Woulf of the Polaris M. Co. says he will soon have the properties developed enough to start up their 20-stamp mill at Evans Point.

MARICOPA COUNTY.

The Illinois Copper Co. at Wickenburg are taking out silver-copper ore at the White Cap group, showing glance, grey copper, azurite, malachite and molybdenite.

MOHAVE COUNTY.

S. Bedell of Needles, Cal., says the Mohave G. M. Co. of Boundary Cone mines, will build a 40-stamp mill at Mellon on the east side of the Colorado river, and twenty carloads of machinery are now at that point. A branch railroad will be run from Mellon to the mines, 16 miles in length.

PINAL COUNTY.

The Gila-Pinal Mines Co. is laying a pipe line 4000 feet long and laying in a large wood supply at their mill on Mineral creek, near Kelvin. The company has bought the old Bobtail mines and will resume operations. Twenty-five miners will be put on at the Bobtail.

F. A. Adams and W. Bley are at Riverside working on their gold property, 2 miles above Riverside station. They are running a crosscut tunnel. The surface ore prospects in gold.

YAVAPAI COUNTY.

Superintendent M. S. Taft of Victor mine, on Lynx creek, near Mud Hole, reports a strike of native silver, says the Prospect. Men were drifting from a 30-foot crosscut, 300-foot level. In addition to the silver this crosscut vein runs \$3.50 in gold.

Prospecting is active at Mint valley, 12 miles northwest of Prescott. Several shafts are being sunk and some good gold ore found. Prospecting work was done on Bald hill in this vicinity several years ago and gold found, but the properties were abandoned.

In the miners' drilling contest at the carnival at Prescott last week, Malloy and

Ross of Bisbee, who drilled 34.55 inches, won the double-hand prize of \$150. T. Ross of Colorado won the single-hand prize of \$75, with 17.01 inches.

A hoist has been shipped to the properties of the Alta M. Co., in Eugenia gulch, near Prescott.

Superintendent M. Bradley, of the Lion mine on Cherry creek, says he is taking pay ore from the Lion. The Huntington mill is being overhauled.

Superintendent Pickrell, of the G & C. Con. M. Co., has fifteen steel tanks in the cyanide plant in place and four others have arrived. The plant is 12 miles south of Prescott.

The newly elected directors of the Baumann C. Co. are: H. P. Anewalt, R. E. Sloan, R. E. Morrison, J. Baumann, W. S. Goldsworthy and J. C. Martin, of Prescott, and E. Hart, of Gallup. The officers are: Pres., H. P. Anewalt; Vice-pres., R. E. Morrison; Secy. and general manager, J. Baumann; Treas., W. S. Goldsworthy.

H. C. Clark, of the Rigby M. & R. Co., of Denver, has been surveying a site for the erection of a mill of 100 tons daily capacity at Mayer. It will be the first custom plant to be put up. Contracts for the erection of the plant will be let.

YUMA COUNTY.

A group of mines in Quartzite district has been bonded by G. W. Norton of Mohawk. Development work has begun. The ore carries lead and silver.

The Success Copper Co. of Los Angeles is developing the Goodenough mine, 12 miles southeast of Quartzite. A 25 H. P. gasoline hoist is in place.

The tunnel, 170 feet, on the Desert Queen, near Quartzite, having reached the vein, it has been decided to start another at a lower level. The mine is equipped with 40 H. P. gasoline engine, air compressor and machine drills.

The Yuma Sentinel says the water supply for the King of Arizona mine comes from three wells each 1000 feet deep. The wells are 5 miles from the mine and 700 feet lower, and the water is pumped to the mine and costs the company one-tenth of a cent per gallon.

CALIFORNIA.

ALAMEDA COUNTY.

A site for an oil refining plant has been leased in Alameda at the foot of Fruitvale avenue, on the tidal canal. The plant, besides refining low-grade oils, will manufacture roofing material, creosote, tar, etc.

AMADOR COUNTY.

Superintendent C. E. Purrington, of the Fremont Con. M. Co., near Amador City, is arranging to put up a 40-stamp mill and boiler and hoist.

The Dispatch says C. D. Lane has men at work on the Orr property on Indian creek, near Plymouth.

J. Oneto and H. H. Deacon, Jr., of Sutter Creek, will place a 10-stamp mill on their property above Pine Grove, east of the Defender.

The Mugford ranch of 161 acres, 2 miles east of Sutter Creek, has been bought by a member of the Imperial G. M. Co., which owns the King ranch on Sutter creek. The new purchase adjoins the latter property.

A long drain ditch has been dug and extensive preparation otherwise made to work this part of Sutter creek. It is one of the few pieces of ground on the creek not worked out by early miners.

At the Defender mine, 7 miles above Pine Grove, the new 10-stamp mill has started up. Since the burning of the 4-stamp mill the mine has been opened to the 300 level, and bins are filled with quartz. The ledge averages several feet in width. The old mill turned out \$55,000 during the period it was running. The last shipment of ore made to Selby's returned nearly \$100 per ton. F. B. Joyce, superintendent and manager, owns a three-quarter interest.

BUTTE COUNTY.

The Indian Spring mine near Magalia is reported sold to the Bay Counties Power Co.

Rideout & Co. are timbering the old Pershecker tunnel.

The Evolution mine near Magalia, recently closed, will reopen. F. William is superintendent.

CALAVERAS COUNTY.

Angels Record says that within the past year sixty stamps have been put in at the Melones, and sixty in contemplation the coming year; ten at the Duchess; five at the Sugar Pine; twenty at the Angels; ten at the Oriole; twenty new stamps will soon be added to the Lightner and ten more to the Sultana, making a total of four hundred and twenty-five stamps within a radius of 7 miles of Angels.

W. T. Robinson and E. L. Burns, of Mokelumne Hill, who are prospecting the opal-bearing formation on Stockton ridge, have found in the face of the tunnel two parallel strata, 3 feet apart, both of which contain opals. In the upper stratum the

opals were "dead," or nearly chalky. In the lower one, specimens were found which show some fire.

EL DORADO COUNTY.

Near Placerville, the Craddock 2-stamp mill has resumed.

FRESNO COUNTY.

The Union Oil Co. is making contracts to pipe oil from the Upper San Joaquin oil field to Monterey bay. The line will be about 125 miles in length when built, and is estimated to cost \$250,000. W. L. Stewart is general manager of the company.

KERN COUNTY.

Superintendent McMahon says twenty tons from the Wedge mine of the Con. Mines Co., near Randsburg, milled last week, returned an average of \$75 per ton. This ore came from the crosscut on the 350-foot level.

The Merced mine, in the Stringer district, near Randsburg, has been sold to Ventura men. R. W. Cloud is superintendent.

G. Boydston, H. Hough and J. Batschewald, who are working the Pearl Wedge mine, near Randsburg, sent eight tons of ore to the Atkinson mill last week, which returned \$750.

The Peerless Oil Co. has two wells, Nos. 5 and 17, drilling, one down 400 and the other 500, and a third, No. 17, rigging to begin.

LOS ANGELES COUNTY.

The Sespe Canyon Oil Co. last week struck oil at a depth of 615 feet, 30 feet in the sand.

MARIPOSA COUNTY.

J. L. Brown has discovered a placer deposit, of which he says: "The claim is 4 miles above Bagby's, on the south side of the Merced river, opposite Sherlock's Flat. We have drifted in the channel 40 feet and the gravel will pay 50 cents to the wheelbarrow. A thousand feet of flume will be built. We will have a water supply for a working season of ten months a year."

NEVADA COUNTY.

The Herald says the Lecompton M. Co. has incorporated: T. D. Hicks, W. H. Dunlap, N. P. Brown, D. E. Morgan and H. H. Dunlap. Years ago this mine was a large producer, but the main shaft being located in a canyon, was filled by a flood. Since that time it has been worked in a small way by leasers.

A body of ore has been struck in the Red Bird mine, in Bunts canyon, 6 miles below Colfax. The mine is owned by G. A. A. Tubbs and T. E. Haydon.

The new mill at the Bonnie Bee mine, near Emigrant Gap, is nearly finished. The tunnel is in 480 feet. Over 2800 tons of ore is ready for the mill. Twelve men are on the pay roll. The Zeibright mine, 200 yards east of the Bonnie Bee, will build a 20-stamp mill next spring. Machinery is being hauled from Emigrant Gap to the Red Cross mine, 5 miles farther on the same lode.

At the annual meeting of the Pennsylvania M. Co., at Grass Valley, the following were elected: T. H. Wilhelm, pres.; D. E. Matteson, vice-pres.; J. M. Thomas, sec'y; B. Ople, supt.

SAN BENITO COUNTY.

The Watsonville Oil Co. has bought the rig, tools, etc., of the Gilroy Oil Co. and will use the outfit in drilling near the well drilled by them on the Sargent ranch, near Sargents.

SHASTA COUNTY.

The Free Press says in Shasta county there are 222 groups of mines, silver and gold. These groups consist of from one to eighteen claims. There are fifty-eight copper locations.

SIERRA COUNTY.

The Messenger says the Poker Flat M. Co., at Poker Flat, near Downieville, has stopped the work of hauling the mill on account of snow closing the roads, and will not be able to resume till spring.

A gasoline engine is being put in at the Swansea mine, near Alleghany, to run the air compressor.

The Bellevue tunnel, near Gibsonville, is in 4000 feet and going ahead 75 feet per week, says the Messenger.

At the Thistle Shaft mine, near Gibsonville, the tunnel now being run passed through the hard rock and the drills are working in softer material, requiring the use of timbers. This is regarded as indicating the proximity of the channel.

SISKIYOU COUNTY.

J. F. Boyle, in charge of the Quartz Hill mine on Scott river, is getting ready for mining in the spring. He intends putting up a saw mill.

A large cyanide plant is being built at the Dewey mine, Gazelle district, by G. W. Couper, under supervision of foreman, G. Brooks.

The Yreka Journal says F. M. Ballard has bought the Ironside quartz ledges, on

the divide between Greenhorn and Cherry creeks.

In the coal mine at the Herr ranch, between Yreka and Ager, the water level has been reached.

TRINITY COUNTY

The Bobs Farm quartz mines, consisting of sixteen claims in the Rattlesnake mining district, near Weaverville, has been surveyed for a new mill, and a tramway from the mine to the creek, three-quarters of a mile, to be put up in the spring. The owners are Montgomery & Byers.

TUOLUMNE COUNTY

(Special Correspondence).—The Draper mine, near Soulsbyville, is making a test run, using steam power. The mill is running two shifts. At Jacksonville the Clio is running ten stamps, taking ore from the 300 level, which has been drifted north and south about 150 feet. The rock is being hoisted to the 200 level, and thence is sent to the mill via the new tunnel. Formerly the ore was hoisted to the surface and sent to the mill by a gravity tramway. The Republican, near Jacksonville, is crushing rock in readiness for milling. The Longfellow Consolidated, Big Oak Flat, in charge of F. H. Parkinson, is running the 10-stamp mill one shift and crushing rock from the 450 and 500 levels, and is also milling an old dump with good results.

Sonora, Dec. 10.

The Carters New Era says the Lady Washington tunnel is now in 180 feet and driving at the rate of 25 feet a week. The prospect shaft at the Top Notch mine, back of Old Town, is down 75 feet. Quartz has been struck bearing free gold. The Draper is using hand drills, being unable to get fuel oil. The Black Oak closed down one day last week on account of failure of power.

C. Cummings has finished his contract at the Sullivan mine near Soulsbyville. It is said that a new record was made for the county in sinking, 100 feet having been sunk in fifty-five days. The shaft is down 188 feet.

The Albatross M. Co. has bought the Jersey Blue and Vulcan claims near Carters. The Jersey adjoins the south extension of the Goldwin.

The cyanide plant at the Rawhide mine, near Jamestown, has been attached to satisfy claims against the owners. The plant was built to work the tailings and is not the property of the App Con. Co.

The 10-stamp mill on Mt. Hood, near Jamestown, has resumed. J. H. Burkhart is superintendent.

The cleanup at the Fairview at Minersville from the first run was \$5000. The company bought the mine last spring for \$60,000; since have expended \$40,000 in improvement. A ledge of free-milling rock has been opened.

Superintendent O'Brien of the Big Casino M. Co., near Big Oak Flat, has fifty men at work. On the Mack claim, the boilers and hoist are in place.

Supt. J. N. Judson has opened up the pay shoot on the Vine Spring mine, near Columbia, which is under bond to Santa Ana men.

Estee & Co., at their gravel mine on the Doyle property, near Columbia, are drifting to find the width of the pay streak.

W. Grant has men at work exploring a marble quarry on the Vine Spring ranch. Two bids for running drifts have been let by the Jumper Gold Syndicate at \$200, 500 feet each in the Jumper and Golden Rule.

The Republican mill, near Jacksonville, is in operation.

The Phoenix Lake power plant was shut down last week and as a result mines relying on electric and water power were obliged to suspend entirely or reduce the force. The rains thus far this season have been heavy and the snowfall in the mountains deep; the cold weather has frozen the snow and the volume of water from the Sierras is small. A body of ore carrying free gold and a quantity of rich sulphurets has been struck in the Vine Spring mine, near Columbia.

Owners of the Over mine at Saw Mill Flat, near Columbia, are prospecting on a parallel vein. In the Over connections have been made by upraise from the tunnel level with old surface workings. Some gold was found while this upraise was being put through. A shaft will be started on the vein in the tunnel 1100 feet from the surface.

The Woodbury placer claim, on Yankee Hill, near Columbia, will be operated again as soon as water is available. The Dondero claim, near it, is in readiness for another run when the water comes.

The Golden Era, formerly the Page mine, is being equipped by Conlin & Pownall, the owners. A compressor, new hoist and concentrator is being put in, and a telephone line run from the mine and connected with the water company's line. The mine is near Italian Bar. The 55-foot winze in the 175-foot tunnel will be sunk 150 feet deeper. The ore carries

high-grade sulphurets. A crushing plant of five stamps is now on the mine.

The \$50,000 cyanide plant at the Confidence mine is nearly completed and will be in full operation by the first of January.

Gravel struck in the Ranch mine on the Doyle place, near Columbia, in an old river channel, is reported to prospect 25 cents to the pan on bedrock.

W. H. McClintock will incorporate a mining company to operate the Payday and Stokes mine near Don Pedro. The company will be named the Don Pedro Gold Mines.

Operations are to be resumed on the Lampher mine at Confidence, north of the Confidence mine, on the same vein.

At the Mt. Jefferson mine at Groveland, Foreman J. H. Gilmore is opening up the ore bodies on the third and fourth levels. The pump has been sunk 25 feet and an ore bin put in at the 400. The mill has resumed.

YUBA COUNTY

The Brown's Valley mines, including the Pennsylvania, have been sold by F. W. Johnson and T. J. Hibbert to the Standard Con. M. Co., of San Francisco, who will develop the properties.

COLORADO

BOULDER COUNTY

J. H. Ransom, owning the Fissure mine, near Boulder, reports having cut into ore assaying 5 ounces gold and 1½ ounces silver.

The Boulder County Oil & Refinery Co. at Boulder is operating. Samples of water-white kerosene, gasoline and benzene are being exhibited. The by-products vaseline, paraffin and lubricating oil have not yet been treated. The casing of the Citizens well has been pulled and will be taken to a well to be drilled ½ mile north of the two Otero wells.

The directors Wellington G. M. & M. Co., P. M. Housel, A. Johnson, C. A. Wolcott, W. W. Degge, propose a pyritic smelter for their property on Gold hill, near Boulder.

The Times says it is proposed to open up the Caribou district by a tunnel to be run from Eldora 2 miles long and will give that district a depth of 1000 to 1500 feet, and will also afford drainage for mines in the district.

The Enterprise mine, Spencer mountain, will be worked by the leasers, Phillips & Shahan.

The Revenge tunnel, being driven into Bryan mountain by the Revenge D. Co., is in 75 feet and has cut a telluride vein. This tunnel will cut thirty properties.

The Fourth of July tunnel, at the base of Arapahoe peak, is now in 300 feet, with two air drills at work.

The leasers on the Revenge, Nelson and Harpel made another shipment this week. The Senator Tillman, El Dorado mountain, has closed down for the winter.

The machinery has been placed on the property of the Tungsten M. & M. Co. at Jenny creek and work will begin on the Walter A. shaft.

The Jasper Oil Co., near Boulder, has resumed drilling with its first well down 1300 feet and expects to reach the oil this week. It is intended to start the Blue Jacket, which is owned by the same company.

Total shipments of oil from the wells since their discovery is fifty-five carloads, 6891 barrels. The value of the oil produced and delivered by rail to the present time, at \$1 per barrel, is about \$7000. It is estimated that \$1,000,000 was expended in the northern oil belt.

CHAFFEE COUNTY

The Vivandiere shaft of the Twin City M. Co., near Turret, is down 565 feet and will be sunk to 1000.

The Crete, near Turret, has a 10-inch vein assaying \$80 in gold.

The Independence, at Turret, is shipping several cars of high-grade ore.

J. Powers is developing a claim in Longfellow gulch.

The Josephine, at Turret, owned by B. V. Ritter, shows a 4-foot vein of rusty quartz and sulphides running in gold.

A. Smith & Co., who located a group of claims on Bear creek, have started a tunnel to cut several large veins at 600 feet. They are in 100 feet.

The Record says G. M. Webster has located a 4-foot vein of gold ore near Salda, in the Sangre de Cristo mountains, that assays \$25.

Owing to a scarcity of coke, Manager B. F. Morley of the Buena Vista smelter has banked his fires for a few days. The smelter is treating the siliceous ore from the Mary Murphy mine at St. Elmo, which is leased by the smelter. The iron flux is obtained from the Mike & Starr at Leadville, also leased by the company. The smelter has twenty-five men at work.

CLEAR CREEK COUNTY

The extension of the railroad from Silver Plume to the Terrible mine is in operation. Superintendent G. F. Crawford says he

has added to the number of men at work in the second adit of the Kinda mine. The paystreak is 3 feet wide and runs 20 ounces silver and 2 ounces gold to the ton. The balance of the rock runs \$20 and all of the product will be sent to the smelters. An adit below the second level will be driven from Fall river to cut under this ore body.

Biggar & Co., who for years have been leasing on the Lake tunnel, have a five years' lease on the Windsor Castle, and the main shaft sunk.

Near Georgetown the Kelly tunnel is in 1720 feet and 300 feet in the drift, having been driven 300 feet in November. Three machine drills are run in the tunnel and one in the drift. The tunnel is expected to cut the Boston lode about the first of February. At the Capital Co.'s mine Manager W. Cooper has made 3000 feet of development work and is crosscutting. The shaft is down 200 feet. The company will install a compressor plant. At the Terrible mine, near Georgetown, masons are laying the foundation for the mill and compressor.

The Star tunnel, near Idaho Springs, has passed through a large porphyry dike, which caused much trouble. After a round of holes had been fired, it took two days of tramping to get to the breast, the porphyry having caved. The tunnel is again in granite and will soon reach the Columbia vein.

E. W. Williams of the Specie Payment, near Idaho Springs, says that the Champion and Donaldson mines have already been turned over to his company and men are working on the Donaldson. The Donaldson mill is in the courts on account of a tax title, but will be rebuilt.

Development work is in progress on the Waldorf property, near Georgetown, consisting of the Tobin, Paymaster and Commonwealth claims. The miners drifting on the Wheeling vein in the Tobin have passed the cross lode and ore is beginning to appear again in the breast. A drift on the cross lode will be run 80 feet to the Independence vein and stoping will be continued in two places on the Wheeling lode. The drift on the cross vein from Wheeling will cut the ore body 350 feet deeper than in the Independence, 700 feet below the surface.

Assays made on ore from the west drift in the Gomez mine, near Idaho Springs, says the Gazette, show an 18-inch streak of copper-iron sulphide on the foot wall to carry an average value of \$36.34 in gold and silver. A body of ore is reported in the Harper tunnel. E. Alexander has a contract to drive the tunnel on the Hilton properties and is making 10 feet per day.

Owen & Morgan are putting in a double cylinder engine and an 80 H. P. boiler at the Morning Star. Manager C. E. Stubbs at the Perkins has let a contract to drive the tunnel another 200 feet, in which distance he expects to cut the Stanley vein. The contract will give the tunnel a length of 1700 feet.

Operations on the Pittsburg Co. are being pushed. Shafts will be sunk on both the Dover and Brighton mines. The Dover shaft is down 240 feet.

Superintendent W. T. Darby of the Empire mine, near Idaho Springs, reports making 5 feet per day in the tunnel being driven into Covode Mt.

The Sultelma Tunnel Co. has bought a group of claims in the Cascade district—the Hecla, Calumet, Sultelma, Paymaster No. 1 and Bachelor No. 1—and will drive a tunnel to cut these claims. The company has incorporated; A. A. Pierce, D. A. Clark and F. B. Angell.

Smith & Stokes have an option on the Kongsberg claim, near Georgetown, and are using the Kongsberg tunnel in the development of the Venus. They have extended the tunnel 275 feet into the Venus, where they cut a 6-foot vein.

Bristol and partners are developing the Badger and other claims of the Gold Fissure Co., near Empire.

Superintendent C. Jarbeau has thirty men at work on the Gold Dirt, near Empire. The output of smelting ore is 150 tons per month, average \$45. The mill dirt is being stored pending the erection of a cyanide mill.

On the No. 6 level a body of smelting ore has been opened up. A three-compartment upraise is being driven from No. 6 to connect with No. 3.

DOLORES COUNTY

The News says the Con. Rico M. Co. at Rico, owners of Iron Mine-Exchequer lead through Telescope mountain, intend to put in a pyritic smelter.

Superintendent R. Keller is adding an 80 H. P. boiler to the steam plant at the Emma mill at Dunton.

EL PASO COUNTY

Operations on the oil well of the El Paso G. & O. Co., on the Pope ranch, near Pipeview, are resumed. The well is down 1700 feet.

FREMONT COUNTY

Three hundred wells have been drilled

in the Florence oil field in the last seventeen years by the United Oil Co. Each well drilled costs from \$3500 to \$5500 and the average depth is 2200 feet.

GILPIN COUNTY

The Post reports from Central City sinking at the Grace Darling shaft of the Electric Spark G. M. Co., in Lower Lake district, now down 200 feet. They are installing machinery and putting up a shaft building.

E. M. Messiter of Central City is sinking the shaft on the Sampson claim, in Leslie gulch, near South Boulder creek. Ore has been opened up and assays show ½ ounce gold, 240 ounces silver and 20% copper. Some silver glance has been found.

The Buckhorn extension and Snowden group of eight claims, at the head of Silver creek, in the Silver, Lake and Hawk-eye districts, near Central City, are reported sold. The property will be operated through tunnels this winter and the product shipped to Black Hawk as long as the roads remain open for hauling. In the spring they intend to erect shaft buildings and install machinery on the Buckhorn. W. H. George of Central City is manager.

Cripple Creek and Denver parties have a lease and bond on the Stright tunnel, near Boulder park, and work will be carried on all winter. The tunnel is in 200 feet.

The Central City Call says the Moffat or Northwestern, Denver & Salt Lake Railroad will run along South Boulder creek, up Boulder park and through the main range west of James peak. The tunnel through the main range will be 2 miles long. A temporary road will be built over the range which will pass along Jenny creek. Work is to be started on the road next month.

The Central City Call says the Mountain Monarch M. Co. has reorganized and the capital stock increased, with the following new officers: R. M. Hicks, F. Rinckle, F. Augustus, W. Augustus. There is a crosscut in 200 feet and a drift on the Chieftain vein 150 feet. A winze has been sunk on this vein, but they were stopped by water. They have shipped ore to the Peterson mill at Gilpin and to the Golden smelter, but expect to build their own plant. O. L. Duffield of Rollinsville is manager.

Central City says the Victoria is being worked by Stephens & Co. and its output is being treated at the Peterson mill in Gilpin.

Babcock & Co. have cleaned up their Beaver Creek placer after a successful season. Some placer mining has been carried on in Gamble, Lump and Moon gulches and on Jenny and South Boulder creeks.

Manager J. E. Lightburn has seventy-five men at work at the Perigo mines and has the 30 stamp mill in Gamble gulch running.

Superintendent A. M. Willard of the Travis Gulch M. & D. Co. is sinking on the Garfield shaft in Travis gulch, near Central City.

The Call says up Jenny creek operations will be carried on all winter on the Walter A. property where wolframite ore has been found.

Omaha, Neb., men are interested in the Franklin property in Moon gulch, near Central City, and a crosscut tunnel has been started to cut the veins with depth.

Leasers are working in the Gold Collar mine, Eureka gulch, at a depth of 300 feet, and taking out milling and smelting ores.

Central City reports Superintendent W. H. Richards has resumed operations at the King property in Nevada district on the 80-foot level, and will begin stoping. The Nevada Con. M. Co. is working the 200 level of the Lamberson & Warren mine and are shipping ore. The ores carry lead values and are handled at the mills and sampling works. Bartle & Co. of Nevada, leasing the English-Kansas mine on Quartz hill, are making shipments to the mills. Their last lot of smelting ore carried four ounces gold per ton. They are working the property on a lease from the Kansas-Burroughs Co.

A company has been formed to operate the Foote & Simmons mine on Bobtail hill, near Central City, and machinery will be installed and the shaft sunk 400 feet to the 1000-foot level.

GUNNISON COUNTY

Manager W. R. Callicotte, the Sunrise M. Co., near Pitkin, has the tunnel in 400 feet siliceous ore lying between walls of porphyry and granite. The Sunrise group has fourteen claims in Tellurium gulch at the foot of Treasury mountain. A. E. Moyn is working the Maid of Orleans group, which lies across Quartz creek from the Mineral Farm basin.

The Revenue group of claims in the Box Canyon district, between Ohio City and Wauanita, is reported sold to New York men for \$50,000. The vein showing

in the bottom of the shaft is 7 feet wide and assays \$15 in gold. As soon as a road is built shipments will begin. E. K. Buttolph of Denver is manager.

LAKE COUNTY.

(Special Correspondence).—The Last Chance M., M. & T. Co., Denver, Colo., owning 70 acres of lode claims and 20 acres of placer ground on the south side of Bull hill, 10 miles west of Leadville, are driving a tunnel. In 90 feet the tunnel is 1000 feet below timber line, and will cut the veins at a depth from 100 to 2000 feet. Ore assays from \$10 to \$65 per ton; will erect a mill later on.

Leadville, Dec. 10.

The Times reports that the drop in silver has not closed any properties at Leadville, but, should it continue, its had effects will be felt, as there are a number now operating that barely pay on 50-cent silver and have only been able to mine at that price recently through more economical banding of their ores. While a still further drop will not stop all mining there—as Leadville has other metals—it would for a time materially affect the industry. Outside of this question and its effect on the mines of Leadville, mining conditions are good, as a large amount of new work is under way and more is planned.

On North Star mountain the Ling, the Lee Gers, Viking, Montgomery and other properties are installing milling and concentrating machinery. The Ling is shipping by pack train to Alma.

At Leadville the Valentine M. Co. has resumed.

A company has been formed to explore the territory in East Tennessee park. The company has a number of claims near the Helen Gould group, and drill holes have shown good geological conditions.

The Resurrection mill is nearly completed. It will treat 150 tons per day of low-grade sulphide, using electric separation to obtain high-grade zinc. The Resurrection ore also contains a small amount of gold, which will be saved with the iron, lead and copper.

The cyanide mill in course of erection at the Ballard mine will treat a class of ore heretofore not successfully handled. It is low-grade siliceous material that by smelting costs \$4 to \$5 to treat. Experiments made on this ore have been thorough, and it is known that the material can be treated by cyanide.

The Bohn property is leased by E. L. Daniels and others and iron is being shipped from the main workings.

The Leadville Dispatch says the Empire Gulch M. Co. are shut down while a pumping plant is being put in. Recently they entered the contact and struck a heavier flow of water than they could handle.

Ore shipments from Leadville district for November reached 75,000 tons; December is expected to show a further increase, because of new producers. A large percentage of these shipments are low-grade material. The Vinnie and the Golden Eagle properties were cut at a depth of 1300 feet by the Yak tunnel, showing the lode at that level.

Manager C. E. Dewey says he will resume operations at the Cloud City mine, near Leadville, and expects to contract with the Colorado Fuel & Iron Co. for manganese. A year ago the company while exploring in an upraise from the 500-foot level cut through 40 feet of manganese ore. About 150 tons were shipped to the Illinois Steel Works. There is a spur of the Colorado & Southern at the mine so that transportation charges will be lessened.

The surveyors have completed their work on the Daisy & Laura placer on the ridge west of Leadville.

The Arkansas Valley smelter at Leadville has made a contract for a large quantity of fireclay from Big Evans gulch for making brick and lining.

T. S. Schlessinger at Leadville is shipping iron ore from the Bon Air and P. O. S. To put a new plant on the Bon Air, repair the shaft, cut two new stations and make other changes cost \$20,000. A plant has been installed at the Starr and mining resumed. The pumps at the Bon Air keep the Starr dry to the 550 level.

The Johnny mine is connecting its lower levels with the Yak tunnel extension. The Rex shaft, operated by the Keystone Co., is nearing the contact. Manager T. Kyle of the Boulder M. Co. is prospecting low-grade ground from the new shaft.

The Last Chance, near the Dyatt properties, is being worked by T. S. Schlessinger of Leadville. The mill is being re-modeled and new concentrators put in. The mill will handle the Peerless and Last Chance ore.

The Two Bit M. Co. at Leadville has shipped a lot of ore assaying 16.07 ounces gold, 48 ounces silver and 15% copper. This comes from the vein recently cut in the shaft. D. McNiven is superintendent.

H. Dyatt, operating the Peerless and Peerless Maude properties in the Horse-shoe district has opened a body of silver

and lead ore in the lime and it is similar to that in the Continental Chief on the low gulch side of the range. In the Peerless it is 4 feet wide. On the Peerless Maude the shaft is down 180 feet. Much of this ore is of shipping grade, averaging \$30 per ton. Six men are at work.

No Leadville property has as yet been compelled to close on account of the fall in silver. The smelters' cut has helped the situation.

The Salida plant is taking a large amount of iron ore from Leadville. The Catalpa-Crescent leases are shipping thirty to forty tons of iron daily, and considerable low-grade silver ore from the Dinero dump is moving. The New Monarch ships 150 to 200 tons daily and has a great amount of oxidized ore on hand.

The new workings in the Bangkok-Cora Belle shows mineral that will carry fifty ounces silver, and Manager Newell will begin to ship.

LA PLATA COUNTY.

The Miner says the Happy Five Co. have six men at work on the Small Hopes and are taking out ore.

N. H. Harbaugh is operating properties at the head of Tiburcio gulch.

The Neglected Co. will put up a mill on Junction creek, near the mouth of Wall's gulch.

The Durango Girl shipped several tons of ore to Durango last week.

LAS ANIMAS COUNTY.

The C & S. R. R. Co. has struck oil in one of its wells at Barela, near Trinidad. The People's Oil Co. received two carloads of casing last week and have resumed drilling.

PUEBLO COUNTY.

A 9-foot vein of coal is reported struck on the Tabor-Skinner ranch, near Pueblo, at a depth of 450 feet, while an oil well was being drilled. D. H. Moffat and G. E. Ross-Lewin of Denver are directors of the company.

SAGUACHE COUNTY.

The Crestone Star M. & D. Co. is incorporated by Missouri men; A. Hughes, G. W. Schweich, J. W. Kinzel. The company owns three claims and a mill site on Terrible hill, near Crestone and adjoining the Cleveland. Three veins cross the property, and 500 feet of work has been performed to determine their location and dip. A tunnel is being driven to be 10 feet in length. This property is located on the Hayden dyke, which runs north and south along the range of mountains. There is sufficient timber on the ground for use in the mine.

SAN JUAN COUNTY.

Superintendent Martin says the Tom Moore tunnel, near Silverton, is in 1700 feet, with indications of approaching the shoot for which it is being run.

Silverton Standard says the Charter Oak mine is to be opened by a 500-foot tunnel.

Superintendent W. R. Pyke of the Royal M. Co., near Silverton, says the Royal tunnel on Sultan mountain cut the King vein at 1040 feet, 900 feet from the surface. Drifts to the south will be run and the tunnel run 200 feet to the Mazeppa vein.

SAN MIGUEL COUNTY.

Lessees operating on the land of the Butterfly-Terrible Co. at Ophir have sent to the officers of the company a gold bar valued at \$1100, the result of the last run. The company is doing development work. There are sixteen men at work.

SUMMIT COUNTY.

The Cashier, near Breckenridge, has fifty men at work. The 20-stamp mill is being added to, which will make the capacity 200 tons per day.

The dredger on the Swan placer, owned by the American Dredge Co., of Boston, which has closed down for the season, averaged 1700 cubic yards every twenty-four hours, two shifts of twelve hours each—47 feet to bedrock. The company will declare a dividend and build one or two dredges next summer, costing \$75,000 each. This company also operates the Gold Run placer, sluicing with giants. In working up hill they lost water pressure. Next spring a force pump will be used to wash the ground.

The Hamilton mine, in Summit gulch, has resumed after three years' idleness. A company has taken a bond on the property and raised from the lower level, so that the ore may be trammed into the mill.

TELLER COUNTY.

In the Canadian King 2 feet of five-ounce ore has been found. Some time ago the values disappeared. In prospecting along the wall a few shots blew out a slab of rock disclosing the vein giving assays of five ounces in gold to the ton.

The lessees on the War Eagle at Windy Point have run a crosscut in ore a distance of 30 feet and no walls visible. As the ore is broken it is running \$40 a ton. A half interest in this property is held by Strat-

ton's Cripple Creek M. & Dev. Co. and the other half owned by S. J. Kelhey.

O. B. Finn & Co., leasing the Magna Charta on Ironclad hill, have begun work on foundations for a small cyanide mill. The mineral averages \$10 a ton.

The output of the Last Dollar mine for November, officially reported by Superintendent Waldron, amounted to sixty-four cars.

The Valley City Leasing Co., Cripple Creek, operating the Shurtloff on Bull hill, are shipping three cars of ore per week from the seventh and eighth levels averaging four ounces in gold per ton. The shaft is being sunk from the 800 to the 900 level. Manager M. Bowers says during November he shipped 400 tons of four-ounce ore.

At Cripple Creek lessee F. D. Jacquette, operating on the Rising Sun claim, is shipping three carloads per week, value \$30. He is working on the Pinto vein. Barr and associates have made a cleanup on their lease on the Pinto claim and shipped out fifty-five tons which went 2.25 ounces gold. They have been working through the shaft, which is down 550 feet. Sweatman & Co., working on the Pueblo claim, have a shaft down 125 feet.

Members of the water committee say it is proposed to run a drainage tunnel 10,000 feet long to tap the mines of Cripple Creek at a depth of 3000 feet. Another tunnel known as the El Paso will be run, the Mary McKinley, Elkton and El Paso guaranteeing \$100,000.

The 4-foot vein in the Dillon at Cripple Creek is producing a car of ore a day, averaging \$50 a ton. Two cars of \$30 ore are shipped each week from the 500-foot level of the Coriolanus. The Par Value G. M. Co., which leased these properties, intends to ship its ore from the Coriolanus through the United Mines tunnel to the Economic mill instead of shipping out of the district. The Mary Cashen, also leased by the Par Value, is shipping two cars per week from the third and fourth levels.

The Bonanza King No. 1 on Tenderfoot hill, Cripple Creek, is shipping ore.

Lessees on the north end of the Pharmacist have opened the north extension of vein No. 2 of the Empire State, near Cripple Creek.

The Lettie H. G. M. Co. has incorporated to operate claims near Woodland Park; J. C. Griffiths, J. C. Carroll, G. E. Powell, I. F. Frye. Operations are carried on through a tunnel, but it is intended to sink a shaft. The formation is felsite, porphyry and metamorphosed granite and jasper.

A strike of smelting ore has been made by lessees in a drift on the 600-foot level of the Kittle M., owned by the Anaconda Co. at Cripple Creek.

C. Wilder, leasing on the Arapahoe claim of the J. Johnson Co., Cripple Creek, is shipping ore from the 300-foot level. Wilhelm & Co., leasing on the Wilson claim of the Free Coinage Co., is shipping ore from the 275-foot level. The pay shoot is 8 inches wide, \$250 rock.

Milwaukee men have a bond and lease on the Poorman Extension claim of the Le Clair Co., Cripple Creek. Manager B. Gilbert is putting up a hoiler and hoist and will sink to 300 feet.

War Eagle Leasing Co., operating on the War Eagle property, near Cripple Creek, will increase their output by sixty tons of ore daily.

Lessee Whalen, working the Happy Year claim of the Central Con. Co., has two cars of ore now ready to ship.

Lessee C. Martin at the Little May on Beacon hill, Cripple Creek, has found the vein 300 feet east of the shaft. He found the vein in an open cut on the hillside. Martin and associates have a two-years' lease.

The Ajax, near Cripple Creek, has resumed after a week's shut down to repair the compressor.

R. Snyder, leasing on the Agnes, near Cripple Creek, is shipping ore from the 100-foot level. The value is in a gouge vein running \$100 per ton.

Work has resumed at the Little Nell, near Cripple Creek, and returns from the first carload shipped gave returns of \$45 gold.

N. Wilson, leasing on the Half Moon of the Matoa Co. on Gold hill, Cripple Creek, shipped two cars of \$30 ore last week from the sixth level. Bad air has interfered with his work.

The Mary Mack claim, near Goldfield, adjoining the property of the Homestake Co., is reported leased. It is intended to sink the shaft to 100 feet and then run drifts.

Lessees on the Isabella dump at Cripple Creek are shipping a carload a week. The five smokestacks of the Isabella G. M. Co. were blown down by the gale which struck the camp last week. It was found that the sulphur fumes had corroded the iron around the base of the stacks.

Woods brothers, near Victor, claim to have discovered an extension of the Wild

Horse in the Damon on Ironclad hill. In a bottom level of the Damon they drifted south and west to a body of low-grade mineral, having the same character as the Bull hill streak.

Lessee Gilmore on the Work, on the west side of Raven hill, near Anaconda, says at a depth of 100 feet a drift cut 2 feet of gangue. The mineral was oxidized and partly talc. Assays on washing show a value of \$90 in gold and tailings \$40.

Victor says T. Mulvahill has leased a portion of Deadwood No. 2. The output from the Golden Cycle during November was 3500 tons, of which 500 tons was shipped by lessees. The values averaged \$25. November shipments from the Hull City placer of the Independence Con. Co. by Cripple Creek M. Co., lessee, were 1800 tons, average value \$40.

Lessee Darnell, who opened up the ore body on the War Eagle of Stratton's Cripple Creek M. & Dev. Co., has opened up the same shoot on the Unexpected claim of the Central Con. Co. where he has a lease. Portions of the Amanda and Kate Hollis claims are between the Unexpected and the other property of the Central Con. Co., but that company has right of way through that ground.

Hanson and others, operating the lease on the Maud Helena of the Pilgrim Co. on Bull hill, Cripple Creek, are crosscutting to the west at a depth of 125 feet to find the Delmonico vein.

During November the Last Dollar, near Cripple Creek, produced sixty-four cars, twenty-four going to the mills and forty to the smelters. This is an increase over the production of the previous month. The tunnel is now in 2800 feet.

Lessee Wallace on the Beacon of the Prince Albert Co., near Cripple Creek, has struck 3 feet of ore below the 185-foot level.

The contractors sinking the C. O. D. shaft, up Poverty gulch, near Cripple Creek, for 200 feet, are pushing the work. When completed, they will be down 930 feet.

The Lincoln M. & M. Co. will resume development on its property near Gillett.

C. Tillery, operating a block of El Paso property through the Old Gold tunnel, has opened an extension of the C. K. & N. vein.

Manager Rice of Stratton's Cripple Creek M. & D. Co. has closed the assay office at the Summit and the work is now being done by private assay offices. The reason given was that the expense was greater than the price for which the work could be let out.

The directors of the C. K. & N. G. M. Co., Cripple Creek, have declared a dividend of 1 cent a share, payable December 18. The company is not operating on its own account, but leases to H. Granfield. The property consists of one claim, the Raaler. Granfield has yet two years on his lease. Connection is being made with the workings of the El Paso Co., which adjoins, and pumping arrangements effected; ore is being broken on the 300-foot level. The shaft is being sunk. The El Paso Co. has the C. K. & N. vein at the 600 level.

The Storm King M. Co., Cripple Creek, have leased their property adjoining the Victor mine, on the east slope of Bull hill, to J. W. Palmer and J. G. Owens of Denver.

Lessee S. Vidler has opened the vein on the Ironmaster claim of the Jack Pot Co., near Cripple Creek.

Manager Gilbert, working on the Poor Man extension claim of the Le Clair Co., is building a gallows-frame and will sink the shaft to 300 feet.

Franklin, Sift & Co. of Colorado Springs have taken up the option of the Morrill lease of the Grace Greenwood property of the Anaconda Co., near Cripple Creek. The price was \$5000.

IDAHO.

ADA COUNTY.

The World says that one prospector in the Black Hornet district, near Boise, has located forty claims within an area 5 miles east and west by 3 miles north and south.

BLAINE COUNTY.

The miners at the Liberal, near Hailey, have been laid off, pending the placing of an air compressor.

IDAHO COUNTY.

C. W. Luck of Weiser says of the Big creek district in the Thunder mountain section that across the head of this creek and its upper tributaries is a series of fissure veins that can be traced for miles in an east-west direction. They run through the Archæan and Palæozoic formations, and are often filled with quartz which generally carries much iron. Dikes of porphyry and diorite also are found. Although some fine milling and high-grade ore is reported, the ore in these veins is generally low grade and base. The ledges are extensive and may prove profitable if transportation facilities and a cheap

method of treatment can be had. The development work going on on Logan and Smith creeks and the opening up of the discoveries on Quartz and Profile creeks will prove the deposits in this zone. Water power and wood are abundant.

The St. John and Belcher mining properties at Elk City are bonded to Spokane, Wash., men. The claims adjoin the Laurel Hill mine and have a ledge 8 feet between the walls, assaying \$20 in gold. Winter quarters have been erected for the men and the work is being pushed.

SHOSHONE COUNTY.

Near Delta lumber is being hauled for a fourth dredger on Beaver creek, to be built on the Louis Nistler claim. Carpenters are building dredger No. 3. The pit is dug at the mouth of Trall creek, on the Coulson & Heustlis claim.

Busen & Brooks are drifting on their placer ground on Trall creek and taking out coarser gold than before. They are at the mouth of Potosi creek and find bedrock at 21 feet.

R. D. Bohannon is drifting for the bedrock on the Houie hydraulic property in Pony gulch.

C. S. Chrysler, manager of the dredger companies near Delta, has taken up the bond on the F. C. Gordon properties, 170 acres, including the sawmill, water right, residence, etc.

Manager J. Keene of the California Con. M. Co., near Wallace, expects to add the Monarch property to their holdings.

Manager J. W. Webb of the Burke M. Co., near Burke, is pushing work on the buildings at the Buckeye property, a group of six claims adjoining the Ajax and Oom Paul.

Work at the California Con. mine on Nine Mile creek, near Wallace, has been suspended for the winter. The main lead of the California has been worked to the line of the Mammoth property, which it adjoins on the west.

C. M. Chrysler, president of the dredger companies at Delta, has sold six placer claims to the Beaver Creek G. M. Co. for \$5500. The claims are located on Beaver creek and adjoin the claims being worked by dredgers. The claims comprise 140 acres.

MICHIGAN.

HOUGHTON COUNTY.

The Mohawk mill at Houghton is in operation. The new mills of the Wolverine and Mohawk are more nearly automatic than any others in the district. The rock goes in at one end and the mineral reaches the packing bin at the other end, without having been touched by hand. The two heads require nine men on the floor.

The Tecumseh mine, near Houghton, has closed down, owing to the bumpy character of the rock. The shaft is down 2270 feet. The Champion mill is in operation.

MONTANA.

BROADWATER COUNTY.

A new tunnel is being driven on the H. & H. mines, near Winstan.

The Powell Co. at Elliston reports that the Boston & Seattle M. Co. propose a reduction plant and will treat ores mined between that place and Basin.

Manager W. L. Higgins says the vein of the Emery mine, near Deer Lodge, has been struck from the shaft below at 1050 feet from the original working shaft on the incline.

DEER LODGE COUNTY.

The Ophir mine, at Anaconda, is unwatered. The Travona mine is being unwatered with a 500-gallon haling tank.

FLATHEAD COUNTY.

(Special Correspondence).—A strike has recently been made in the Brick & Brannigan mine. The main tunnel has entered a body of ore 16 feet wide.

The find made near Iron Meadow last September is being developed. Supplies to last six months have been taken in.

Mining in West Fisher and Libby Creek districts is being stimulated by the report of the building of an electric car line.

It is reported that the Way Up Co., near Cabinet, are planning for a mill next season. The mine is situated 1 mile from the Mother Lode mine on West Fisher creek.

H. Hildebrandt reports work progressing on the Alabama group.

The Mustang Co. has ore which assays \$100 in gold per ton. This property is approaching the producing stage.

At the American Kootenai Co.'s property the Gardner electric drills are used. Fifteen men are employed on development work. Several shoots of ore have been found the past two months.

The development of the Bachelor group by the Michigan Co. continues with eight men. This company will build a mill below the American Kootenai mill and get water from West Fisher creek.

The placer mines on upper Libby creek

have closed for the winter. They have been steady producers for the last fifteen years. Last spring two hydraulic plants were erected to work gravel from the higher bars.

Cabinet, Dec. 1.

JEFFERSON COUNTY.

J. P. Ormond and E. Chapman of Anaconda have taken a lease and bond of the Belle of Basin mine, near Basin. The Hiawatha mine, near Basin, is under lease and bond to Dowling & Madden. The property has a shaft down 500 feet and a 400-foot tunnel.

LEWIS AND CLARKE COUNTY.

The Boston & Seattle Co. have twenty men at work on the Ontario-Richmond group, on the main range southwest of Helena. The tunnel on the Ontario is in 20 feet and is 120 feet below the crosscut tunnel.

Ore is being taken out from the upper workings of the Kruger copper mines, at Copper Camp and teamed to Silver for shipment.

The Teepie M. Co. has incorporated, under the laws of South Dakota, to work claims in the York district, near Helena. The property has been prospected for 2700 feet on the surface by tunnels and shafts, one tunnel 320 feet and one 165 feet. The ore averages 18% copper, 60 ounces in silver, and \$18 in gold. A tunnel 600 feet long will be driven to crosscut the vein at a depth of 420 feet. R. E. Teepie is president and manager.

F. W. Fosberg, manager the Corbin concentrator, near Helena, will put up a 50-ton concentrator at the East Pacific mine in the Winston district. There are 17,000 tons of ore on the dumps at the East Pacific mine.

MISSOULA COUNTY.

It is reported at Wallace, Idaho, that a smelter is to be built at Saltsee, Mont., the St. Regis section of the Cœur d'Alenes.

H. Welsh, coal mine inspector for Montana; S. S. Secor, a banker of Winnebago, Minn., and Minneapolis capitalists bonded the Monitor and development has begun. Shortly afterwards Mr. Welsh and his associates bonded the Richmond. Development showed that the vein crossed both properties for more than 1000 feet. A smelter site and water rights were secured. There is water power to operate the smelter and an electric tram from the mine to reduction works, a distance of 6 miles. It is said that the electric plant is to be installed early in the spring, and work on the smelter to be begun later. A number of developed properties in that section are ready to ship ore.

PARK COUNTY.

A natural gas well has been discovered in the coal measures, 2 miles west of Livingston.

The 10-stamp mill of the Gladstone M. Co., near Pioneer, will be in operation next week.

SILVER BOW COUNTY.

The Standard reports the reef near Brown's gulch, 7 miles northwest of Butte, has been bonded to Finch & Campbell of Spokane for \$100,000. It will be cyanided.

NEVADA.

EUREKA COUNTY.

W. Laird has leased from the Richmond M. Co. the old and new Williamsburg mines on Adams hill, adjoining the Bullwhacker mine. The lease is from December 1, 1902, and runs for two years. R. A. Laird and G. Young Jr. are interested and they are preparing to begin work. The Williamsburg produced the richest silver-lead ore ever taken from Adams hill.

HUMBOLDT COUNTY.

The final payment on the Sheba group of mines at Star City has been made by the Sheba G. & S. M. Co. of Salt Lake City, Utah. The company holds twenty-seven locations, together with a mill of fifty tons daily capacity. The lower tunnel is in 240 feet, with the first ledge to be tapped in the next 60 feet, while the main Sheba ledge is 400 feet distant. J. T. Kessel is superintendent.

The Foltz placer mine at Spring Valley has been sold to Chicago capitalists for \$40,000. The placers have produced \$3,000,000.

NYE COUNTY.

The Record says "Hanapah," the name of a mining proposition recently located 18 miles east of Tonopah, is a Japanese word meaning "hang on tight." Superintendent F. B. Work reports at a depth of 70 feet in the new shaft of the Hanapah a foot of ore on the foot wall which assays 175 ounces silver and \$30 gold.

The Miner says R. T. Brodeck of Bakersfield, Cal., has bought the Morning Star and Georgia Taylor mining claims on the south side of Gold mountain, near Butler. Machinery will be installed. On the Stone Cabin drifts are being run on

the vein at the 200 level and a crosscut driven south on the same level. The shaft is being sunk at the rate of 4 feet a day, with three eight-hour shifts, and is down 245 feet. An engine and crusher are being installed.

The Miner says at the Fraction, near Butler, the west drift from the 400 level of shaft No. 1 is in 300 feet and the face in milling ore. Ore is being hoisted from the 300 level of shaft No. 2. The shaft of the Mizpah Extension is down 550 feet and the crosscut from the 500 foot level is in 345 feet.

At the New York-Tonopah the shaft is down 460 feet, the formation showing quartz and calcite seams. The Montana-Tonopah shaft is down 355 feet; stringers of quartz and mineralized porphyry are found. Crosscutting will be begun at the 400 station. At the Ohio-Tonopah the shaft is down 360 feet; was sunk 130 feet during November.

The Tonopah Fraction Extension M. Co., S. A. Knap, superintendent, are down 35 feet in its new shaft on the Outing claim. A steam hoist is on the road from Candelaria. Sinking will be continued to the 500 level.

The annual report of the Tonopah M. Co. states that the past year 7000 tons of ore, having an average value of \$61 per ton, have been extracted and piled up at the mine.

OREGON.

BAKER COUNTY.

At the Wisconsin mine, near McEwen, drifts are being run from both sides of the main shaft at the 200-foot level.

Superintendent J. M. Doyle, the Justice mine, near Sumpter, reports having cut the ledge in the crosscut tunnel 10 feet in, opening up 3 feet of ore. The ore is oxidized.

Manager Hennessey is running a drift at the Gold Bug-Grizzly mine, near Sumpter, to tap the main shaft and arranging to drain the surface water. By this means the shaft can be sunk 200 feet without putting in a pump.

Superintendent J. M. McPhee, the Golden Wizard mine, near McEwen, is putting in a hoisting and pumping plant to sink the shaft 1000 feet. A wagon road has been built from McEwen station to the mine. Manager McPhee says he will put up a mill in the spring.

JOSEPHINE COUNTY.

The Greenback G. M. Co. is putting up a 20-stamp mill and an electric light plant at Greenback, 10 miles from Leland.

SOUTH DAKOTA.

LAWRENCE COUNTY.

The shaft of the Columbus Con. M. Co. at Central City is being sunk below the 200-level. It has been enlarged from two to three compartments. The old hoist is being replaced by a larger one and a Prescott sinking pump has been put in. The vein is 80 feet wide. The 50-ton stamp cyanide mill is running, but a larger one is in contemplation.

The Penobscot M. Co. at Garden City has the new plant completed and is crushing 4000 tons of ore per month, forty stamps dropping in a solution of cyanide. There is room for forty more stamps, and ten will be added early in the new year. The ore is from the Realization mine, developed by a shaft 200 feet deep.

The new steam hoist on the Oro Hondo, joining the Homestake on the south at Lead, consists of a large double-drum hoist, 500 H. P. boilers, air compressor to run twelve drills, and pumps. It is intended to sink 2000 feet. Sinking is in progress.

There are six cyanide mills in course of construction in the district, with the following monthly capacities: Horseshoe, 30,000; Hidden Fortune, 7800; Penobscot, 6000; Hall & McConnell, 1800; Jupiter, 4500; Golden Crest, 1500; total tonnage, 51,300.

The Homestake M. Co. at Lead will double its air pressure in the mine by installing a 100-drill compressor at the Ellison hoist. New boilers are being put in, capacity 1000 H. P. Hereafter it will only be possible to visit the mills and hoists of the company on special permit from the office. It has been fifteen years since the company permitted visitors underground, owing to the annoyance it caused and the liability involved, and it is rarely that a person not in the employ of the company is permitted to step onto one of the cages.

The Globe G. M. Co. has its plant in position in Nevada gulch, 1½ mile southwest of Lead, and sinking has been resumed, hoisting with a gasoline hoist. An air compressor and drills are to be installed. The shaft will be sunk 500 feet.

The Clover Leaf M. Co. has reached the 600 level in the Uncle Sam mine on Elk creek, 10 miles south of Deadwood. The station is being cut on the lower level; when the 700-foot station is cut a pump will be installed, which will have a capacity of 1400 gallons per minute.

The Jupiter Co., near Central City, is

excavating for their cyanide plant, which will have twelve tubs and a capacity of 100 tons per day.

The Penobscot Co. expects to start their mill Jan. 1. They have finished a bunk house for the mill men.

The Portland Co. is prospecting and running machine drills day and night.

TEXAS.

LLANO COUNTY.

The iron mountain at Llano, on the Houston & Texas Central road, is reported sold to Chicago capitalists, the price paid being \$300,000.

UTAH.

BEAVER COUNTY.

A. G. Lewis has bonded the McGregor group on the west side of Gold mountain and will run a tunnel to tap the ledges at depth.

Manager Johnson is driving a tunnel on the Cactus group, near Frisco, which is expected to tap the ore bodies at a depth of a mile. A six-drill compressor is being put up. Mr. Johnson says a concentrator and smelter will be built at the mouth of the tunnel. Through a vein of copper-bearing ore the raise from the 200-level has broken into the 100-level. In 15 feet more the raise from the 300-level will connect with the ore body on the 200. On the west the ledge has been crosscut for 20 feet, with one wall exposed. Along the strike drifts are being extended.

Manager M. J. True, of the Bluebird Copper-Gold M. Co., whose properties are near Milford, says work will be resumed. The shaft on the Bluebird, now at 275 feet, will go deeper.

Manager Johnson of the Cactus, near Beaver, says the upraises between the first and second levels and from the third to the second have broken through. They are in chalcopryite which averages 12% copper. A 6-drill air compressor and boilers are being installed. Twenty-five men are at work.

Manager Colcord of the Excelsior mine and mill, at Frisco, has resumed and has cut the original vein in the tunnel. The Admiral M. Co. is working its 1500-foot tunnel and has ore.

BOX ELDER COUNTY.

President P. W. Madison, Century M. Co., reports a \$3200 bar of gold bullion as the result of the last ten days' run in November at the company's mill in Park valley.

The Century, of Park valley, shipped last week a bar of gold bullion worth \$3200, the proceeds of ten days' run at the mill. The ore assays \$10 per ton.

GRAND COUNTY.

The drift being run to reach the bedrock at the Basin placers, near Pinhook, is in 300 feet. McDonald, Robinson & Emmet will work the mine all winter. They have a vertical depth of 60 feet in surface wash.

JUAB COUNTY.

Dry concentration is having another trial at the May Day of Tintic.

The Miner reports a strike of argenterous ore in the property of the Clifton Copper Belt M. Co., in Willow Springs district, Deep Creek, near Eureka.—An electric hoist is being installed at the Yankee over the winze in the tunnel.—The crosscut from the 500-foot level of the La Clède shaft has cut the vein, which is 7 feet between walls. A 4-foot breast of ore samples 7% copper, with gold and silver.

PARK COUNTY.

The Montana Coal & Coke Co. has begun operations at Horr. There are 250 coke ovens with a total capacity of 9000 tons per month. The company has an electric tramway connecting Horr with Aldridge. They employ 350 men.

SALT LAKE COUNTY.

The Tribune says the Utah Con. M. Co. has ordered a dividend for the Highland Boy of Bingham of \$1.50 a share, or \$450,000, payable January 1. At present the company is producing 50,000 pounds of bullion daily, carrying copper, gold and silver, from 515 tons of ore.

The Old Catwawa M. Co. has incorporated; T. Botkin, C. H. Chandler, T. F. Chanton, D. E. Sloan, H. P. Repman, F. W. Allison, O. Potter.

The Tribune says 300 tons of ore per day are being delivered at lower terminal by the United States tramway at Bingham. Of this, forty-five tons comes from Old Jordan branch.

The smelters in Salt Lake valley reduced during the month of November 56,500 tons of ore.

The Tintic M. & D. Co. has bought the Honest Abe and May claims, lying between the Yampa and Highland Boy Con. group, near Bingham.

The Tintic M. & D. Co. will erect a smelter on the company's Bingham property the coming season. The site has been selected and work will be begun on the building in the spring.

G. H. Robinson, manager of the Yampa

mines at Bingham, has gone to Montana to experiment with several carloads of ore at the Heinze smelter at Butte, to determine the style of plant to be erected by his company at Bingham, where there is a flow of 600 gallons of water a minute, which will supply all needs.

SUMMIT COUNTY.

The Greater New York M. Co. has bought the J. I. C. and R. P. H., two patented claims adjoining the New York M. Co. properties at Park City for \$20,000. J. N. Ferguson is manager.

The Cincinnati Con. M. Co. is incorporated, with Salt Lake City headquarters, for \$500,000, to develop the four Cincinnati lode claims in Uintah district; J. A. Kirby, E. D. Woodruff, A. Hanauer, D. S. Taggart, J. Oberndorfer.

The new boiler and air compressor for the Hawkeye McHenry have been placed.

The Cincinnati Con. of Park City has been incorporated. The company's headquarters will be in Salt Lake. The officers are J. Kirby, president and general manager; E. D. Woodruff, vice-president; A. Hanauer, secretary and treasurer, who with D. S. Taggart and J. Oberndorfer makes the directorate. This company has twelve claims at the head of Deer valley.

Superintendent Rood of the Ontario reports a strike in the shaft on the 2000 level. When the shaft repairing is done, a station will be cut at the 2000 and a drift run to the Ontario vein.

At the Nalldriver a foot of ore was found while excavating for the boarding house which gave 110 ounces silver.

UTAH COUNTY.

The American Fork M. Co. at American Fork have cut the ledge in the tunnel at a depth of 200 feet. The ore shows 32% lead, 59 ounces in silver and \$4 in gold per ton. On the company's Healy claim a ledge carrying 35% lead has been opened to a depth of 80 feet by a shaft. A 200-foot tunnel will be run to get under the shaft.

WASHINGTON COUNTY.

The Tribune says operations at the Grand Gulch on the Utah-Arizona strip, near St. George, have been suspended by the company, but a contract will be let to sink the shaft deeper.

WASHINGTON.

CHELAN COUNTY.

Operations on the Crown Point, at the head of Railroad creek, in the Lake Chelan district, are stopped for the winter. During the summer 75 feet of tunnel were driven and an adjoining claim added to the company's holdings. In addition to gold and copper, the Crown Point contains molybdenite.

The lower tunnel on the Holden property is in 275 feet.

FERRY COUNTY.

Contracts to ship 1000 tons of Quilp ore to the Tacoma smelter have been made, and two cars of ore sent to the works on Puget sound. It is expected to ship fifteen cars monthly from the dump containing 2000 tons, in addition to the regular output of fifty tons a day sent to the Granby smelter at Grand Forks.

Shipments of Granby ore to Granby smelter have averaged \$23 a ton. The ore on the dump which will be sent to the Tacoma plant will run \$15 or \$20.

From the California mine a carload of ore has been sent to the Hall Mines smelter at Nelson, and five carloads to the Tacoma smelter. The shaft at the mine is down 460 feet and is being sunk and timbered at the rate of 2½ feet a day, the quickest time in shaft sinking ever made in this camp. A station will be cut at the 500-foot level and drifting started, after which sinking will be resumed.

OKANOGAN COUNTY.

W. T. Mendenhall of St. Paul, Minn., has gone to Chesaw to make the first payment on a bond for \$40,000 on the Grant group of claims, on Buckhorn mountain, owned by Grant & Anderson. The Grant mine has a vein 50 to 60 feet wide, carrying copper and gold, with a 6-foot streak.

Five carloads of Black Tail ore have been shipped to the Granby smelter. It came from the main Black Tail vein.

J. Carignan and B. Spada, working the Libby, in Silver Creek district, report a body of arsenical iron ore carrying values of \$21 gold and \$2 copper.

WYOMING.

ALBANY COUNTY.

A strike of platinum is reported in the Lookout Jack, which is one mile south of the Ramhler mine. The ore runs \$7 in gold. The mine is owned by Fox, Hegewald and others of Laramie.

CARBON COUNTY.

Manager Bowen of the Ben Hur M. Co. at Battle Lake will resume work on the

Lena Shields group at the head of Cow creek. The tunnel will be driven ahead.

The Pearl lode, in the Battle Lake district, is reported sold to Delaney Bros. of Cripple Creek, Colo. The claim consists of twenty acres and the ore contains gold and copper.

UINTA COUNTY.

A decision is made by the Secretary of the Interior in the controversy between the American Con. Oil Co. and the Union Pacific in favor of the railroad company. The trouble involved the ownership of lands upon which the Spring Valley coal mines are situated. The Secretary held that the lands in question are more valuable as coal lands than as oil lands, and, as oil lands, are not exempt from the railroad grant for this reason. The Spring Valley oil fields lie largely within the boundaries of the government grant to the Union Pacific, and the ruling will affect companies and individuals aside from the American Con. Oil Co. While the question of the ownership of the lands has been in dispute much development work has been done.

FOREIGN.

AUSTRALIA.

QUEENSLAND.

The water supply for the company at Mount Morgan has been kept up and work proceeds in the Premier mine. The ore treated during October was 21,311 tons, yielding 13,816 ounces gold.

The old Champion reef, now known as the Golden Bar Co., lately sent five tons of ore to Cockle Creek, New South Wales, for treatment, which yielded ten ounces eleven pennyweights of gold per ton.

BRITISH COLUMBIA.

The Lardeau-Duncan Dev. Co. has been incorporated by Minneapolis, Minn., men to operate the Primrose and the Golden Circle properties, near Ferguson, on the North Fork. J. M. Miller is president.

Operations have been resumed at the Homestake mine in the South Belt with fifteen men. The Velvet has suspended shipments, pending alterations to its hoisting plant.

Surveyors for the Canadian Pacific railroad have found, between Lodge Pole creek and headwaters of Flathead river, seams of workable coal from 4 to 30 feet thick. They have run open cuts and faced off the seams ready to take out the coal as soon as transportation is obtained. This field is near the north Kootenay pass.

It is estimated that the placers of East Kootenay creek have yielded \$16,000 this season. They are worked largely by Chinamen.

A strike of ore in the Cariboo-McKinney Co.'s Cariboo mine at Camp McKinney at the 400-foot level west has been made. Heretofore the pay ore found has been to the eastward.

The face of the drift, 160-foot level of the Waterloo mine, Camp McKinney, shows 5 feet of gold quartz.

The French company, Societe Miniere, operating in Atlin district placers, has cleaned up for the season, the first two days' shoveling giving 196 ounces gold, the next ninety ounces.

Twenty-five men are working at the Raco mine, near Nelson, and are shipping twenty-two tons per week.

The largest nugget found in Atlin district during the season weighed twenty-eight ounces and was found on the ground of the Atlin M. Co. Pine creek will be dredged by an American company which is putting in a dredger. The machine consists of an endless chain of sixty-four buckets, each weighing a ton. These buckets dig into the gravel and dump into a hopper at rate of eighteen per minute; 3000 gallons of water per minute is forced through the screen and the gold is washed out and onto tables. The dirt, boulders and gravel are elevated and deposited behind. The dredger will dig 3500 cubic yards per day.

The Second Relief mine at Erie has been shut down, owing to shortage of water and lack of facilities for keeping the cyanide plant from freezing. The stamp mill and cyanide plant have been running steadily through summer.

The Dumas G. M. Co., operating the Dumas mine on the north fork of the Wild Horse creek, are prepared to continue work all winter.

The Northwestern Development Syndicate has paid \$16,500 to A. F. Rosenberger on the Camborne group near Goldfields. Work is in progress. It is the intention to erect a stamp mill early in the spring. A contract has been let for the transporting of 1000 tons of ore from the Hunter V. mine, near Ymlr, to the railway. Ore will be shipped to the Hall smelter.

The discovery of platinum in ore is reported from the Contact mines in Burnt basin.

B. N. White, of Spokane, has bonded the Bayonne mine for \$50,000, 10% down. The Bayonne, which was located last fall,

was the first location in an almost virgin country lying between the south end of Kootenay lake and the Salmon River valley.

The North Forks Placer Co., owning placer claims along Salmon river, has decided to build a dam across the North Fork of Salmon and put in 1½ mile of sluices for operating giants next summer. The company has a concession from the crown giving it 170 miners' inches of water for this purpose. The water will have a 200-foot head.

The Granby mines, near Phoenix, are shipping fifty-two cars of ore daily, which is double the tonnage of the last several months.

It is reported that H. H. Claudet of London, representing the Canadian Oil Co., will put up at Rossland a plant for experimental work on the ores of that district.

The tramway between the Venus mine and the Athabaska mill at Nelson is in operation. An average of twenty-five tons a day will be handled.

The Cherry Creek G. M. Co. has been incorporated by St. Paul, Minn., men to operate seven claims adjoining the Morgan group, near Nelson. A bond was taken on four claims and an option on the other three. Three tunnels will be driven on the Mascot claim.

The manager reports shipments from Le Roi No. 2 in October amounted to 2413 tons; contents, 1042 ounces of gold, 3360 ounces of silver, 66 tons copper. The returns from ore amounted to \$19,390; have located with diamond drill on 300-foot level to west of tramway dike upward continuation of ore body. Over foot wall stope above 500-foot level diamond drill core shows the ore is 10 feet thick; average of three assays is, gold \$96 per ton, copper 2½%. Will probably require to crosscut to the south 95 feet to open shoot; have started to crosscut for ore body.

MEXICO.

CHIHUAHUA.

Manager J. R. Roslyn says he will resume operations at the Santo Domingo placers on Concha river, 80 miles east of Chihuahua. The method of treating the dirt is by steam shovel and sluices. There are 3000 acres of this ground.

The sampling works of the Campana Metalurgica de Torreón, S. A., at Chihuahua, are in operation. The works are situated in front of the Mineral railroad depot.

SONORA.

(Special Correspondence).—The Alma M. Co. at Carbo are installing a gasoline engine and will use California oil for fuel. They are doing development work and have 1500 feet of shafts and levels. When they reach water level they will determine as to the best treatment and then erect a mill or smelter. Ores are carbonates and oxides at present. Carbo, Dec. 5.

At Penasco Quemado, in the Altar district, the Sonora M. & M. Co. are developing the ore body recently discovered. It is reported the company will change the reduction process, the smelter having proved unsuitable to the ores.

The Yaqui C. Co. is developing the coal veins found on the land grant owned by the company. The coal is bituminous.

At Las Planchas de Plata, in one of the properties of the Big Mountain M. Co., a new tunnel has cut the ledge 250 feet below the surface, opening up a body of silver ore. The company is operating a 10-stamp mill, but will add to its capacity.

Eight converters are running at Cananea. The carpenters are building coal and coke bins of 300 cars capacity.

Secretary Hay has sent to Ambassador Clayton, at the City of Mexico, a memorandum of protest lodged by citizens of Indianapolis against the Judge and other persons at Cananea for the seizure of copper mines owned by Americans, with the request that the matter be brought to the attention of the Mexican Government.

ZACATECAS.

Near Zacatecas, the San Rafael syndicate has 1000 men at work and development work is being pushed. Cyanide plants with a capacity for treating 100 tons daily are in operation on the La Central.

JAPAN.

Yokohama reports a placer gold field discovered in Kongowaken, near where a trial working of a gold reef has been made. Japanese law forbids aliens to mine placers.

KLONDIKE.

It is reported from Dawson that the best pay yet found on Henderson creek was struck late in November on the Sixty Pup by J. Williams and partners, pans running from \$3 to \$21. Between thirty and forty cabins were built along Henderson creek last summer. Rampart was nearly depopulated in October by a stampede to the upper part of Hootalan river, in the Minook district.

Personal.

B. C. RIBLET, of Nelson, B. C., is in Encampment, Wyo.

V. CLEMENT of Salt Lake has returned home from Mexico.

PERCY MCGEORGE has returned from California to Leadville, Colo.

W. H. WICKHAM of Denver, Colo., has returned there from the East.

W. J. SEEP, of El Paso, Texas, has returned there from Denver, Colo.

A. C. BEATTY of Denver, Colo., is in New York to meet J. H. Hammond.

W. S. TYLER is expected to return from Utah to Denver, Colo., next month.

MANAGER WOLFE, the Polaris M. Co., Clifton, Ariz., is visiting in Virginia.

H. LOMAS, Denver manager for Crocker-Wheeler Co., is in the City of Mexico.

T. L. WALDEN is superintendent of the Alliance tunnel, near Park City, Utah.

MANAGER F. R. REED of the Liberal M. Co., Hailey, Idaho, is in New York.

F. H. PERKINS, of Salt Lake, Utah, is at Silver City, N. M., examining mines.

F. DALY has been appointed foreman of the Silver King mine at Park City, Utah.

M. S. EFFINGER, manager of the Wolverine at Park City, Utah, has gone East.

L. C. TRENT, mining operator, has returned to Salt Lake City, Utah, from Palo Alto, Cal.

SUPERINTENDENT ICKES of the Liberal group of mines, near Hailey, Idaho, is in the East.

A. GRAVES, of Denver, Colo., is in Carbo, Sonora, Mexico, looking after mining interests.

W. L. WATTS of Los Angeles has been in Tucson, Arizona, inspecting mines in that vicinity.

F. W. FOSBERG, manager Corbin concentrator, has returned to Helena, Mont., from the East.

F. M. DRESCHER, of Denver, Colo., assumes a position at the smelter in Verde, Arizona.

L. SEARING, general manager Denver Engineering Works Co., Denver, Colo., is in New York.

W. T. MENDENHALL of St. Paul, Minn., is in Chesaw, Wash., where he has bought a group of mines.

W. H. GEORGE is manager the Buckhorn Extension and Snowden group, near Central City, Colo.

O. L. DUFFIELD, Rollinsville, Colo., is manager the Mountain Monarch M. Co., near Central City, Colo.

E. R. ABADIE, superintendent of the Champion M. Co., Nevada City, Cal., has left for San Francisco, Cal.

T. S. DAYTON, resident manager Mexico M. & S. Co., Mexico City, has returned there from Denver, Colo.

A. VEITCH, assistant manager the Arizona Copper Co., has returned to Clifton, Arizona, from a visit to California.

A. BUCKBEE, general manager Virtue Con. M. Co., Baker City, Or., is in Montreal, Canada, on company business.

J. T. KESSEL has gone from Park City, Utah, to Mill City, Nev., to take charge of the mill of the Sheba M. & M. Co.

W. R. THOMAS, superintendent Central Eureka mine, Sutter Creek, Cal., has returned to the mine from Berkeley, Cal.

J. K. VANATTA and C. C. BAUM of the Spearfish G. M. & M. Co. have returned to Spearfish, S. D., from Colorado Springs.

A. W. BURCHARD, vice-president of the Greene Con. C. M. Co., Cananea, Mexico, has returned from a trip to Los Angeles, Cal.

J. T. KESSEL, former superintendent of the Anchor, Park City, Utah, is superintendent Sheba G. & S. M. Co., Star City, Nev.

F. J. CANNON has returned to Salt Lake, Utah, from Cherry Creek, Nev., where he has been making mine examinations.

SUPERINTENDENT C. E. PURRINGTON of the Fremont Con. M. Co. has returned to Amador City, Cal., from San Francisco, Cal.

W. L. CLARK is manager Quentin Investment Co., Cripple Creek, Colo., successors to the R. C. Bogy Investment Co. of Denver.

D. E. BIGELOW, recently of San Francisco, has gone to Kalgoorlie, West Australia, to take charge of a mining property there.

SUPERINTENDENT G. C. KIRBY, Electric Light mine, near Confidence, Cal., has returned from a business trip to San Francisco, Cal.

W. E. PROCTOR of Sutter Creek, Cal., after a visit to his home and to London, has returned to resume the management

of the Mina Esprito, at Cana, Colombia, South America.

F. RICHMOND has returned to Salt Lake, Utah, from Park City, Utah, where he has placed a new hoist on the New York Bonanza.

G. LEZINSKEY, president of the Gold Tunnel M. Co., Nevada City, Cal., has returned to San Francisco, Cal., from a visit to the mine.

W. H. HAMPTON has resigned the management of the Columbia Mines Co. and will engage in general engineering at Grant's Pass, Or.

J. R. H. ROBERTSON, chief chemist for the Gold & Silver Extraction Co., Denver, Colo., sails to-day for Scotland. He returns in May, 1903.

E. MCCORMICK, of Lordsburg, N. M., former superintendent Aberdeen Copper Co., goes to Durango, Mexico, in the same capacity for the Penoles Co.

J. T. HENLEY has resigned as superintendent Elkton mine, Cripple Creek, Colo., being succeeded by Mr. Winslow, formerly assistant superintendent.

DR. DAVID T. DAY is in San Francisco on business connected with the mining and metallurgical display at the St. Louis, Mo., Exposition, of which he is manager.

Book Notices.

"Locomotives; Simple, Compound and Electric," by H. C. Reagan, locomotive engineer; 12mo. XIII + 604 pages, 309 figures, including many half-tones. Fourth edition by a standard authority on this subject; increased by 131 pages and 83 figures over preceding edition, cloth, \$2.50. John Wiley & Sons, New York.

Commercial Paragraphs.

THE Holtboff Machinery Co., through T. Fielding, their Denver agent, have an order for fifteen cyanide tanks, weighing 210 tons, from the Telluride Reduction Co., Colorado Springs, Colo., for their new mill.

THE Crocker-Wheeler Co., through their Denver, Colo., house, have supplied the Western Packing Co. of Denver with a large number of dynamos and generators. The plant will be in operation December 15.

THE Llewellyn Iron Works of Los Angeles have an order from the Gold Road M. & Ex. Co. of Acme, near Kingman, Ariz., for a complete cyanide plant, capacity 150 tons, and Cornish type of crushing rolls for their mill; rolls 40 inches diameter by 16 inches width of face.

AMONG recent orders taken by the Colorado Iron Works Co., Denver, Colo., is a 30-stamp mill and concentration plant for El Carmen Copper Co., Durango, Mexico; twenty-four impact screens, crushers and rolls for the Gold Road Mining and Exploration Co., Acme, Arizona.

IN the burr slot screen when sheets were punched by hand and holes gauged by a common needle the burrs could not be avoided and the clean cut perforations of machine work could not be obtained. Most screens are now punched without burrs. Tinned plates are still used in 10x14-inch and 14x20-inch sheets in sectional frames. The tin is burned off before using. The American Engineering Works, Chicago, makes many burr slot screens and many tinned screens in compliance with orders. It has introduced two improvements, first punching the black pick metal instead of the tinned metal to save the trouble of burning off tin. Then came the suggestion: Why punch this soft metal at all when hard steel equally thin can be punched. So a number of parties have accepted the substitute of thin hard steel punched with fine holes. These screens are said to give the free discharge which cause mill men to favor tinned screens, and last longer.

THE Crocker-Wheeler Co., Ampere, N. J., manufacturers of electrical machinery, have included among their shipments of engine type generators for the month of November, one size 336, 400 K. W., for the Stevens-Girard Building, Philadelphia, Pa.; one size 111, 100 K. W., one size 140, 125 K. W., for the Missouri Pacific Railway, St. Louis, Mo.; two size 168, 150 K. W., for the Penna. Malleable Co., McKees Rocks, Pa.; one size 224, 200 K. W., for J. L. Mitchell, Philadelphia, Pa.; two size 55, 50 K. W., for the Live-right & Greenwald Mfg., Philadelphia, Pa.; two size 140, 100 K. W., for the McClintic-Marshall Construction Co., Pottstown, Pa.; one size 336, 300 K. W., for the Grand Crossing Tack Co., Chicago, Ill.; one size 448, 400 K. W., for the Lake Construction Co., Erie county, Pa.; one size 275, 250 K. W., for the Wilmington City Elec. Co., Wilmington, Del.; one size 275, 225 K. W., for the Pine Bluff & Western Ry., Pine Bluff, Ark.; two size 168,

150 K. W., one size 224, 200 K. W., one size 84, 75 K. W., for the Woodward & Lothrop Bldg., Washington, D. C. The company reports that their new mill building is now being occupied, enlarging their floor space by 60,000 square feet, giving increased facilities for prompt deliveries on large orders.

New Patents.

DEWEY, STRONG & CO.'S SCIENTIFIC PRESS PATENT AGENCY, 330 Market St., S. F., has official reports of the following U. S. patents issued to Pacific coast inventors:

FOR THE WEEK ENDING DECEMBER 2, 1902.

714,851—WINDOW SHADE BRACKET—J. C. Barker, Seattle, Wash.
714,755—LOCATING WATER—F. H. Brown, Los Angeles, Cal.
714,777—SNAP HOOK—C. A. Buck, S. F.
714,878—VEHICLE POLE CAP—B. M. Davis, Los Angeles, Cal.
714,686—SHOW CASE—W. G. Flint, San Jose, Cal.
715,060—BRAKE—R. B. Hahn, Los Angeles, Cal.
715,066—THRESHER—W. A. Hesse, Red Bluff, Cal.
714,695—TRACTION DEVICE—A. A. Honey, Tacoma, Wash.
714,915—CAR BRAKE LEVER—W. C. Keithly, S. F.
715,095—DEPTH INDICATOR—H. S. Lathrop, S. F.
714,922—WRENCH—W. Lee, Los Gatos, Cal.
714,809—NUT LOCK—J. H. Leonard, Woodland, Cal.
714,719—JAR CLOSURE—J. M. Long Jr., S. F.
714,929—GAS GENERATOR—W. S. May, Orlton, Ariz.
714,936—FORK CROWNS—Muller & Jackson, Oakland, Cal.
715,132—CHECKING APPARATUS—A. Nelson, S. F.
715,141—OIL WELL WATER CHECK—W. Plotts, Whittier, Cal.
714,961—EJECTOR—T. S. Smith, Los Angeles, Cal.
715,224—EDUCATIONAL APPLIANCE—C. E. Wheeler, Seattle, Wash.
714,981—OIL BURNER—J. M. Wishart, Pasadena, Cal.
714,989—GRAPPLING TOOL—H. A. Worthington, Los Angeles, Cal.
715,158—STOVE—R. Young, Tacoma, Wash.

Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

INTERCHANGEABLE FORK CROWNS.—No. 714,936, Dec. 2, 1902. H. Muller and W. A. Jackson, Oakland, Cal. This invention relates to improvements in bicycle fork crowns. Its primary object is to provide a crown to which the forks may be secured otherwise than by the ordinary method of brazing, which necessarily weakens a vital part of the machine. A further object is to provide a spring fork of extreme simplicity, strength and durability particularly adapted to this crown. It consists of a crown integral with the steering post and having segmental flanges at its ends, fork sides adapted to fit within and be embraced by said flanges, and means for locking the crown and fork sides together.

CAR BRAKE LEVERS.—No. 714,915, Dec. 2, 1902. W. C. Keithly, San Francisco, Cal., one-half assigned to L. H. Brown, San Francisco, Cal. This invention relates to an improved combination lever which is especially designed for use upon street and like cars where hand levers may be employed for the purpose of applying the brake. It consists of horizontally journaled parallel shafts located above the floor of the car, one of said shafts having a lever extending downwardly through the floor for the attachment of the brake-connecting rod, the other lever projecting upwardly and connected by a link with a rock-arm attached to the second shaft and at such an angle with relation to the first lever that when the shaft is turned it acts to first give a rapid movement to the brake and connecting parts, and after the brake has been brought in contact with the wheels the movement of the lever is at such an angle as to provide for a slower movement with greatly increased power to set the brake firmly. A hand lever is connected with the second shaft, through which lever the movements are effected.

Latest Market Reports.

SAN FRANCISCO, Dec. 12, 1902.

METALS.

SILVER.—Per oz., Troy: London, 22½d (standard ounce, 925 fine); New York, 47½c, refined (1000 fine); San Francisco, 47½c; Mexican dollars, 37½¢ @ 38½¢ San Francisco, 37½¢ New York.

Silver remains practically at a standstill; the slight advance over the quotations of last week has no particular significance.

COPPER.—New York: Standard, \$10.75; Lake, 1 to 3 casks, \$11.65; carload lots, \$11.30; Electrolytic, 1 to 3 casks, \$11.45; carload lots, \$11.25; Casting, 1 to 3 casks, \$11.35; carload lots, \$11.10. San Francisco: \$14.00. Mill copper plates, \$17.00; bars, 18@24c. London: £50 13s 9d spot per ton.

The market continues firm and under the stimulus of a larger inquiry from consuming buyers bolders are now asking a slight increase over those prices which were current. At the present writing the inquiry is for deliveries extending over the first three or four months of next year, and covers every description of the metal.

LEAD.—New York, \$4.12½; Salt Lake City, \$3.50; St. Louis, \$4.00; San Francisco \$4.50, carload lots; 4½ 1000 to 4000 lbs.; pipe 5½, sheet 6, bar 5½c; pig, \$4.75. London: £10 13s 9d per ton.

SPELTER.—New York, \$4.95; St. Louis, \$4.50; London, £19 17s 6d per ton; San Francisco, ton lots, 6½c; 100-lb lots, 7c.

ANTIMONY.—New York, Cookson's, 9½c; Hallett's, 8½c; San Francisco, 1000-lb. lots, 10c; 300 to 500 lbs., 11c; 100-lb. lots, 13@15c.

TIN.—New York, pig, \$24.85@24.95; San Francisco, ton lots, 27c; 500 lbs., 27c; 200 lbs., 27½c; less, 28c; bar tin, 28½c. London, £112 6s spot.

PLATINUM.—San Francisco, crude, \$18.00 @ oz.; New York, ingot, \$19.00 per Troy oz. Platinum ware, 75@80c per gram.

QUICKSILVER.—New York, \$45.50@46.50; large lots; London, £8 15s; San Francisco, local, \$46.00 @ flask of 76½ lbs.; Denver, \$49.50. Export, \$44.50.

BABBITT METAL.—San Francisco, No. 1, 10c; No. 2, 7c; No. 3, 6½c; extra, 17½c; genuine, 35c; Eclips, 37½c.

ALUMINUM.—New York, No. 1, 99½ pure ingots, 35c; No. 2, 90½, 30c to 34c.

SOLDER.—Half-and-half, 100-lb. lots, 18c; San Francisco, Plumbers', 100-lb. lots, 15.10c.

NICKEL.—New York, 50@60c @ lb.; ton lots, 45@48c.

STRUCTURAL MATERIALS.

IRON.—Pittsburg, Bessemer pig, \$24.25; gray forge, \$21.15; San Francisco, bar, 3c @ lb., 3½c in small quantities.

STEEL.—Bessemer billets, Pittsburg, \$30.50 and \$31; open hearth billets, \$32 and \$34.00; San Francisco, bar, 7c to 12c per lb.

CEMENT.—Germania, \$2.90; K. B. & S., \$3.00; Hewmoor, \$2.90; Trowell, \$2.90; Portland, \$3.25 per bbl.

LIME.—Santa Cruz, \$2.25; Roche Harbor, \$2.25 per hhl.

LUMBER.—(Retail): Pine, ordinary sizes, \$20.00@22.00; extra sizes higher; redwood, \$22.00@23.00; lath, 4 feet, \$4.25 @4.50; pickets, \$19.50; shingles, \$2.35 for No. 1 and \$2.00 for No. 2; shakes, \$13.50 for split and \$14.50 for sawed; rustic, \$26.00 @32.00.

NAILS.—Per keg (list prices): No. 20d to 60d, Wire, \$3.30; Cut, \$3.30; 10d to 16d, Wire, \$3.35; Cut, \$3.35; 8d, Wire, \$3.40; Cut, \$3.40; 6d and 7d, Wire, \$3.50; Cut, \$3.50; 4d and 5d, Wire, \$3.60; Cut, \$3.60; 3d, Wire, \$3.75; Cut, \$3.75; 2d, Wire, \$4.00; Cut, \$4.00. Special rates for carload lots.

GENERAL SUPPLIES.

POWDER.—F. O. B. San Francisco: No. 1, 70% nitro-glycerine, per lb., in carload lots, 15½c; less than one ton, 17½c. No. 1*, 60% carload lots, 13½c; less than one ton, 15½c. No. 1** 50%, carload lots, 11½c; less than one ton, 13½c. No. 2, 40% carload lots, 10c; less than one ton, 12c. No. 2* 35%, carload lots, 9½c; less than one ton, 11½c. No. 2** 30% carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 725 kegs, \$1.50 per keg; less car lots, \$2 per keg.

CAPS.—3x, \$5.50 per 1000; 4x, \$5.50; 5x, \$8; Lion, \$9, in lots not less than 1000.

FUSE.—Triple tape, \$3.60 per 1000 feet; double tape, \$3.00; single tape, \$2.65; Hemp, \$2.10; Cement No. 2, \$3.00; Cement No. 1, \$2.65, in lots of 3000 feet and up.

CANDLES.—Granite 6s, 16 oz., 40s., 10½¢ @ set; 14 oz., 40s., 9½c.

CHEMICALS.—Cyanide of potassium, 98%-99%, jobbing, 25@26c @ lb.; carloads, 24@24½c; in 10-lb. tins, 35c; sulphuric acid, in carboys, 66½ B, 2c @ lb.; soda ash, \$2.00 @ 100 lbs.; hyposulphite of soda, 2½@3c @ lb.; blue vitriol, 5½@6½c @ lb.; borax, concentrated, 7@8c @ lb.; chlorate of potash, 12@13c; roll sulphur, 3c; alum, \$2.00@2.25; flour sulphur, French, 3½@3c; California refined, 2@2½c; nitric acid, in carboys, 8c @ lb.; caustic soda, in drums, 3@4c @ lb.; Cal. s. soda, hbls., \$1.25 @1.50 @ 100 lbs.; sks., \$1.05; chloride of lime, spot, \$2.50@2.60; nitrate of potash, in hbls., 8c; caustic potash, 10c in 40-lb. tins; sulphide of iron, 9c @ lb.

COAL.—San Francisco, coast, yard prices: Wellington, \$8.50; Seattle, \$8.50; Coos Bay, \$5.50; Southfield, \$8.00. Cargo lots, Eastern and foreign: Wallsend, \$8.50; Brymbo, \$7.50; Pennsylvania, hd., \$14.00; Scotch, \$8; Cumberland, \$12; Cannel, \$9.00; Welsh Anthracite, \$13.00; Rock Springs, \$8.50, long ton; Colorado Anthracite, \$14.00. Coke, \$10.50 per ton in bulk, \$13 in sacks; Sunnyside, \$8.50, long ton.

WHITE LEAD.—Per lb., in kegs: Five tons and over at one purchase, per lb., 6c; 1 ton and less than 5 tons, per lb., 6½c; 500 lbs. and less than 1 ton, per lb., 7c; less than 500 lbs., per lb., 7½c; in 25-lb. tin pails, ¾c per lb. above keg price; in 1 and 5 lb. tin cans, 100 lbs. per case, 2½c per lb.

above keg price. Dry Lead.—In bbls., 1 ton and over, 6c; do. in kegs, 6½c.

RED LEAD AND LITHARGE.—One ton and over at one purchase, per lb., 6c; 500 lbs. and less than 1 ton, per lb., 6½c; less than 500 lbs., 7c.

ASSAY LITHARGE.—Per lb., 8½c.

BISMUTH.—Subnitrate, per lb., \$1.60.

BONE ASH.—4c @ lb.

BORAX.—Crystal, 7c; calcined, 25c.

CHROMIUM.—(90% and over) per lb., \$1.25.

COPPER.—Carbonate, 20c; Red oxide, 2½c, 60c.

MANGANESE.—(90% and over) @ lb., \$1.25.

MERCURY.—Bichloride, 2½c, 90c.

MOLYBDENUM.—25c @ gramme; 1000 grammes=2½ lbs.

PHOSPHORUS.—(American) @ lb., 80c.

SILVER.—Chloride, 2½ oz., 75c; nitrate, 55c.

SODIUM.—Metal, 2½c, \$1.00.

URANIUM.—Oxide, 2½c, \$3.50.

ZINC.—Metallic, chemically pure, 2½c, 50c.

ZINC.—Dust, 2½c, 10c.

ZINC.—Sulphate, 2½c, .04c.

(These prices are wholesale, f. o. b. San Francisco, unless otherwise noted.)

SITUATIONS WANTED.

Wanted, position as assayer or assistant, Jan. 1st. References. Address Box 13, this office.

Mining Surveyor and Assayer, University graduate, 17 years' experience, desires situation with chance of advancement. Address Box 10, this office.

Cyanide Chemist wants position. Amalgamator and assayer. Graduate School of Mines. First-class references. Address "Cyanide," this office.

Superintendent, competent assayer, chemist and surveyor, experienced in development work, wishes position in any capacity. "Seattle," this office.

Cyanide man and assayer wants position. Can take shift on mill if needed. Practical experience and reliable. C. F., Mining and Scientific Press.

Engineer wants position to run hoist or mill engine or pump. Use to combustion of oil and Corliss engines. Have recommend. Good mechanic. R. Blackwell, Elsinore, Riverside Co., Cal.

All around mechanic, 15 years' experience stationary and locomotive engineer, 5 years foreman of construction and boiler work, wants mechanical position, or engineer on gold dredger. Address C. E. B., this office.

Erecting Engineer and Millwright also Assayer, desires situation. Competent to take charge both of construction and running of plant. Gasoline, steam or water power. Address Box 11, this office.

Competent and reliable technically educated man, 34 years of age, desires position with a good mining company. Has had wide experience in the handling of low-grade gold ores where economy was essential to success. Can give best of references. Address L. D. H., care Mining and Scientific Press.

Mining Engineer with twelve years' practical experience in mines and mills wishes position as superintendent. School of Mines graduate. Has had extensive experience in developing prospects into shape for actual working on a large scale. Also practical cyanide manager, assayer and surveyor. Address "Engineer," this office.

Competent Millman, Machinist and Chemist. Experience free mill and concentrating. College education. Have built and operated mills in Montana for 14 years. Competent accountant and able to administer affairs of a company. Would like situation with a company out of a promoter's hands. References the best. Address H., care this office.

Wanted, position as manager or superintendent of mining property, or would accept a position as consulting engineer. Have had over thirty years' experience and can refer to some of the best known people, both on this coast and in the East. Salary not so much an object as permanent employment. Address "Mine Superintendent," care of Mining and Scientific Press, 330 Market St., San Francisco, Cal.

THE CALIFORNIA DEBRIS COMMISSION, having received applications to mine by hydraulic process from Frank Mining Co., in Safford Flat Hydraulic Mine, near Nevada City, Nevada County, Cal., draining into Safford Flat Creek which reaches South Yuba River; from A. A. Gorman and A. F. Kavanagh, in Sage Hill mine, near Michigan Bluff, Placer County, Cal., draining into Skunk Creek, which reaches Middle River, American River; from Frank Joseph, in Frank Joseph mine, near Watson Gulch, Shasta County, draining into Roaring River which reaches Sacramento River; and from Alfred Dixon, et al., in Big Gun Gold Mine, near Michigan Bluff, Placer County, Cal., draining into Poor Man's Creek which reaches American River, give notice that a meeting will be held at Room 96, Flood Building, San Francisco, Cal., Dec. 29, 1902, at 1:30 P. M.

THE CALIFORNIA DEBRIS COMMISSION, having received applications to mine by hydraulic process from Geo. and Lee Pease, in St. George Mine, near Yankee Jims, Placer County, Cal., draining into Devil's Canyon Creek, which reaches North Fork of American River; and from A. Lundberg, in Old Sluff Gravel Mine, near Vallecito, Calaveras County, Cal., draining into Wades Gulch, thence into Coyote Creek, which reaches Stanislaus River, gives notice that a meeting will be held at Room 96, Flood Building, San Francisco, Cal., Dec. 15, 1902, at 1:30 P. M.

WANTED.

Wanted--Foreman for Concentrating Plant, 200 tons capacity, located in Colorado. Must have ability to earn \$300 per month. Address "Mill Owner," care of Mining and Scientific Press.

Wanted, Phosphate Deposits on the Pacific Coast.
Address L. T. W., Mining and Scientific Press.

WANTED.

1 Chlorination Barrel, lead lined, state size.
1 Steam Boiler, 25 to 75 H. P., Preferred.
Must be in good condition and cheap for cash.
Consolidated Loan & Trust Mining Co.,
RENO, NEVADA.

MINING STOCKS WANTED. We have opportunity to sell and frequent calls for many mining stocks. If you have any good stocks that you are willing to dispose of at attractive prices, send your certificates to us. We can sell them for you quickly. Whenever you send us stocks make us your lowest offer. Orders filled at low prices on all stocks. General references: Dun's and Bradstreet's agencies. New York and other bank references given if desired.
35 Wall Street,
CATLIN & POWELL, New York City.

WANTED.

Second-hand, high speed horizontal tandem compound condensing engine, 400 to 500 horse power, arranged for belting; also air pump and surface condenser. But slightly used. Give full particulars.
Address "Electric," care of this office.

ASSESSMENT NOTICES.

INTO MARBLE COMPANY OF CALIFORNIA. Location of principal place of business, San Francisco, California; location of works, Inyo County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 11th day of November, 1902, an assessment (No. 38) of five (5) cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, room 31, tenth floor, Mills Building, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 3rd day of January, 1903, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 3rd day of February, 1903, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.
CHARLES E. ANDERSON, Secretary.
Office--Room 31, tenth floor, Mills Building, San Francisco, California.

MARINA MARSICANO GOLD MINING COMPANY. Location of principal place of business, San Francisco, California; location of works, Sunny Hill, Shasta County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 14th day of December, 1902, an assessment (No. 33) of one cent per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the secretary, at the office of the company, 415 Front street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 5th day of January, 1903, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 28th day of January, 1903, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.
CHAS. BOVONE, Secretary.
Office--415 Front street, San Francisco, California.

WILLETTA MINING AND MILLING COMPANY. Location of principal place of business, San Francisco, California; location of works, Jacksonville, Tuolumne County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 14th day of December, 1902, an assessment (No. 5) of one (1) cent per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the secretary, at the office of the company, Rooms 233-234 Crocker Building, corner of Post and Market streets, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on Saturday, the 10th day of January, 1903, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 2d day of February, 1903, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.
E. McALLISTER, Secretary.
Office--Rooms 233-234 Crocker Building, corner of Post and Market streets, San Francisco, California.

EUREKA CONSOLIDATED DRIFT MINING COMPANY. Location of principal place of business, San Francisco, California; location of works, Placer County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 9th day of December, 1902, an assessment (No. 36) of one-half (1/2) cent per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, 214 Pine street, room 31, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 14th day of January, 1903, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on SATURDAY, the 7th day of February, 1903, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.
GEO. W. DIXON, Secretary.
Office--214 Pine street, room 31, San Francisco, California.

DEWEY, STRONG & CO. PATENT AGENCY
330 MARKET ST. S.F.

MACHINERY FOR SALE.

FOR SALE.

1,000,000 ft. of standard black wrought iron pipe, second hand, in good condition, size 3/4 to 12 in.
500,000 ft. of flanged wrought iron casing, size 2 to 6 in.
225,000 ft. of flanged threaded end casing, size 2 to 3 1/2 in.
10,000 ft. of 6-in. riveted steel pipe.

ENGINES.

One 30x60 right hand Fraser & Chandler Corliss engine with flywheel 18 ft. dia. x 44 in. face, complete, in first-class order, ready for immediate delivery.
We also have with this engine a triple leather driving belt 160 ft. (endless).
One 16x38 left hand Corliss engine with flywheel 11 ft. dia. x 30 in. face, complete and in first-class order.
One 24x48 Wheelock Corliss engine.
One 20x33 Webster, Camp & Lane double cylinder double drum hoist.

BOILERS.

One 250 and one 450 H. P. Hazleton tripod boilers.
Two 104 H. P. Ahendroth & Root boilers.
Two 185 H. P. Ahendroth & Root boilers.
Four 250 H. P. Campbell & Zell water tube boilers.
Four 125 H. P. Babcock & Wilcock water tube boilers.
One 75 H. P. Heine water tube boiler.

AIR COMPRESSOR.

One 30x24x24 National Drill & Compressor Co. air compressor.

The above items do not represent all of the machinery we have in stock. In addition, we offer you all kinds of automatic, compound and slide valve engines, ranging in size from 3 to 250 H. P.

Horizontal tubular boilers ranging from 10 to 150 H. P.

Vertical boilers, both submerged and full length tubes, from 5 to 100 H. P.

Fire-box boilers from 15 to 100 H. P.

One Silsby fire pump; besides we have engine, duplex and compound pumps of every size.

100,000 ft. of fire hose from the Pan-American Exposition.

Hoisting rope of all sizes.

Shafting, pulleys, belting and a full line of mill supplies.

Four turbine water wheels from 25 to 80 H. P.

Ask for Our Complete Catalogue No. 360.

CHICAGO HOUSE WRECKING CO.

West 35th and Iron Streets,
CHICAGO, ILL.

AT A BARGAIN.

2 PELTON WATER WHEELS, 6' diameter with sheet steel discs 3/4" thick secured to 3" shafts 4 1/2' long.

42 BRASS BUCKETS, 3" across face and riveted to steel disc 5 1/2" apart.

STAND PIPE FOR TWO NOZZLES, one 1 1/2" diameter, the other 1 1/8" diameter. Lever and hood for closing 1 1/2" Nozzle. Size of Stand Pipe 4" diameter.

2 SHEET IRON HOODS for Wheels.

WHEELS built for 400' head.

Address
CALIFORNIA POWDER WORKS,
330 Market Street,
SAN FRANCISCO, CAL.

Second Hand Machinery.

Specialties:

PULLEYS, SHAFTING, BELTING.
BOXES, BOILERS, ENGINES,
HOISTERS, STAMP MILLS, RAILS,
CABLE, and all but little used.

The S. S. Machinery Co.,
DENVER, COLORADO.

ENGINES, BOILERS, PUMPS, Etc.

THE UNITED RAILROADS offers for sale, in good order, the following machinery:

2 sets of Cross Compound Condensing Engines, Scott & O'Neill cut-off, of 750 H. P. each; cylinders 29 in. x 42 in. stroke, with direct acting air pump and condenser, Union Iron Works, builders. This firm built the U. S. warship "Oregon."
2 Circulating Pumps for condensing plant, Thompson & Evans, builders.
1 Elephant Type Boilers, 60 in. x 18 ft., 150 H. P. each, set independent, Union Iron Works, builders.
2 Boiler Feed Pumps, Thompson & Evans, builders.
1 Deep Well Pump, Thompson & Evans, builders.
1 Double Reversible Link Engine, about 15 H. P.

ALSO,

2 sets of Engines built by the Risdon Iron & Locomotive Works, each set consisting of a triple expansion jet condensing engine 15x24x38 in., of 550 I. H. P., high and intermediate pressure cylinders being tandem, of the Reynolds & Corliss types, and the low pressure being a cross with Myers cut-off, each set having an independent air pump division steam end 12x16 in. with Risdon Iron Works condenser.

5 Sterling Boilers, 250 H. P. each, drums 2 ft. 10 in. x 11 ft., and 244 tubes.

2 Risdon Condensers.

1 Circulating Engine.

2 Risdon Air Pumps 9x15 in.

1 Davidson Fire Pump 5x7x10 in.

2 Davidson Feed Pumps No. 5.

1 Dow Duplex Pump 6x8 in.

1 Centrifugal Pump.

APPLY:

UNITED RAILROADS,

Purchasing Agent,

49 Second St., Room 86,
San Francisco, Cal.

For Sale, Cheap for Cash.

20-Stamp Mill,
1 Corliss Engine,
1-70 H. P. Boiler (good as new),
6 Concentrators,
2 Large Pumps, 1 Feed Pump,
Some Belting, Fixtures, etc.

7 miles from Redding, Cal., 4 from Keswick.
H. C. Woodrow,
WHITEHOUSE P. O., SHASTA CO., CAL.

SECOND-HAND

Dynamos, Motors, and Electrical Appliances.
All Money Savers.
Repair Anything.

Have You a Dynamo or Motor For Sale?

GUARANTEE ELECTRIC COMPANY,
S W. Cor. Adams and Clinton Sts., Chicago

FOR SALE--A BARGAIN.

3 Practically New Five-Foot Huntington Mills with Extras. All in AI Condition.
Also, 1 New Four-Foot Frue Vanner.
Absolutely New. Perfect Condition.

Address **FRICOT & MILLER,**
Latrobe, El Dorado Co., Cal.

BUY YOUR TICKETS and ROUTE YOUR FREIGHT

via **THE CRIPPLE CREEK SHORT LINE.**

THE MIDLAND TERMINAL RAILWAY IS THE CRIPPLE CREEK SHORT LINE, THE PIONEER BROAD GAUGE ROAD, THE ONLY LINE carrying Pullman sleepers to and from Cripple Creek District points, runs the GREAT-EST NUMBER of trains, affords the VERY BEST SERVICE at the VERY LOWEST RATES and in connection with THE COLORADO MIDLAND RAILWAY forms through service between Denver and Cripple Creek District points.
For full information call on or address
L. R. FORD, Vice-Pres. and Traffic Manager,
Boston Block, Denver, Colo.

OFFICE OF GRANITE-BIMETALLIC CONSOLIDATED MINING CO.

PHILIPSBURG, MONT., October 15, 1902.
Consolidation of plants and change to electric power permit us to offer, subject of course to prior sale, the Engines, Boilers, Machinery, etc., covered by the following list, at greatly reduced prices:
SECOND-HAND MACHINERY ON HAND.

ENGINES.
1 Fraser & Chalmers Cross-Compound Condensing Corliss Engine, 22 in. x 38 in. dia. x 80 in. cylinders, 500 H. P., with jet condenser. 1 same as above with Knowles Vacuum Pump and Condenser.
1 Fraser & Chalmers Corliss Engine, 18 in. x 42 in., 227 H. P., at 100 lbs. cut-off at 1/2 stroke. 1 Hor. Atlas Engine, 8 in. x 12 in., 25 H. P. 1 Hor. Atlas Engine, 9 in. x 14 in., 30 H. P. 2 McIntosh & Seymour High Speed Engines 9 in. x 12 in., 30 H. P. 1 McIntosh & Seymour High Speed Engine, 7 in. x 9 in., 15 H. P. 3 Upright Engines, 8 in. x 8 in., 15 H. P.

AIR COMPRESSORS.
1 Ingersoll Straight Line Air Compressor, steam cyl. 24 in., air cyl. 24 in., stroke 30 in. 1 Ingersoll Straight Line, steam cyl. 16 in., air cyl. 16 in., stroke 24 in. 1 Norwalk Compressor, steam cyl. 1 in. L. P., air cyl. 16 in. H. P., air cyl. 10 in. stroke 16 in. 1 Knowles Hor. Compressor Blower, steam cyl. 12 in., air cyl. 20 in., stroke 21 in.

BOILERS.
4 Ret. Tubular, 60 in. x 16 ft., 90 H. P. 1 Ret. Tubular, 60 in. x 12 ft., 70 H. P. 8 Ret. Tubular, 54 in. x 16 ft., 62 H. P. 6 Ret. Tubular, 54 in. x 16 ft., 62 H. P. 2 Ret. Tubular, 66 in. x 18 ft., 100 H. P. 2 Ret. Tubular, 52 in. x 14 ft., 50 H. P. 1 Hor. Economic Loco., 20 H. P.

HEATERS.
1 Tubular Heater, 80 in. x 9 ft. 1 Tubular Heater, 36 in. x 12 ft. 1 Tubular Heater, 18 in. x 9 ft. 1 Tubular Heater, 36 in. x 7 ft. 6 in. 1 Tubular Heater, 36 in. x 10 ft.

AIR RECEIVERS.
6 Air Receivers, 60 in. x 20 ft. 1 Air Receiver, 48 in. x 15 ft. 1 Air Receiver, 36 in. x 13 ft. 1 Air Receiver, 36 in. x 9 ft. 6 in. 1 Air Receiver, 42 in. x 8 ft.

PUMPS.
1 Knowles Compound Condensing Duplex Plunger Pump, special pot-valve pattern. L. P. steam cyl. 24 in., H. P. steam cyl. 14 in. Dia. plungers 8 in. Stroke 24 in. 1 Scotch vacuum pump 8 in. x 12 in. x 12 in. 1 Knowles Compound Condensing Duplex Plunger Pump. 1 L. P. steam cyl. 18 in., H. P. steam cyl. 10 in. Dia. plungers 7 in. Stroke 18 in. Vacuum pump 6 1/2 in. x 12 in. x 10 in. 1 Knowles Double Plunger Pump, special pot-valve pattern, 8 in. x 24 in. steam cyl., 8 in. plungers. 1 Knowles Double Plunger Pump, same as above. 1 Station Feed Pump, 14 in. x 16 in. cyl., 7 in. plungers. 4 Boiler Feed Pumps, 8 in. x 10 in. cyl., 5 in. plungers. 3 Knowles Sinking Pumps, 14 x 7 x 5 x 10 in. 1 Knowles Sinking Pump, 12 x 8 x 6 x 12 in.

PLANERS.
1 Iron Planer, 7 ft. x 21 in. bed, planes 24 in. big, 24 in. wide, ways 9 ft. 6 in. long (Lath & Moree Tool Co., Worcester, Mass.). 1 Planer, 20 in. x 5 ft. bed, planes 2 1/2 in. wide, 24 in. big, ways 7 ft. 6 in. long. 1 L. B. Reed (Calro, Ill.) Planer, planes 30 in. x 30 in. between uprights, 2 1/2 in. x 9 ft. 6 in. long.

LATHES.
1 Field Engine Lathe, swing 30 1/2 in. Dia. centers 16 ft., bed 21 ft. over all. 1 L. B. Reed (Calro, Ill.) Lathe, swing 24 in. Dia. centers 8 ft.

DRILL PRESS.
1 Vertical Drilling Machine, table 20 in. dia.

BOLT CUTTERS.
1 Bolt Cutter, hand or power, cuts pipe up to 2 in. dia. 1 Bolt Cutter, cuts pipe 1 1/2 in. and under.

DYNAMOS.
1 T. H. Motor, Type "E," 250 light, 110 volt. 1 T. H. Motor, 250 light, 110 volt. 1 T. H. Motor, Type "E-1," 200 light, 110 volt.

DIAMOND DRILL.
1 American Diamond Rock Boring Co., 115 Courtland St., New York. Double cylinders 4 in. x 4 in., tube bore 1 7/8 in. Drills 1 1/2 in. hole. For steam or air.

For further information, prices, etc., address

WERNER ZIEGLER, Supt. Granite-Bimetallic Consolidated Mining Co., Philipsburg, Mont.

FOR SALE.

For Sale -1 Elmore Hand Power Mining Drill.
Practically new. Cost \$150.00 f.o.b. cars manufacturers. Will sell for \$75.00 cash f.o.b. cars S. P. Railroad station. Address "Hardup," this office.

FOR SALE.

MINERAL COLLECTION--Over 100 small typical specimens of ores and minerals, with scale of hardness. Just the thing for students and collectors. H. S. Durden, 1760 Union St., San Francisco.

The Mines Exchange, Ltd.

MINES and MINING STOCKS.
Address nearest office for reports or quotations.

OFFICES:
Nelson, 1006 Chicago Opera House Bldg., Salmon, B. C. Chicago, Ill. Idaho.

BUSINESS OPPORTUNITIES

I CAN SELL YOUR BUSINESS no matter where it is. Send description, estate price, and learn how. Established 1896. Highest references. Offices in 14 cities. W. M. Ostrander, 1550 N. A. Bldg., Philadelphia

ANNUAL MEETING.

The Regular Annual Meeting of the Stockholders of the **THORPE MINING COMPANY** will be held at the office of the company, 632 Sacramento street, San Francisco, California, on **WEDNESDAY, the 31st day of December, 1902**, at the hour of 2 P. M., for the purpose of electing a Board of Directors to serve for the ensuing year, and the transaction of such other business as may come before the meeting. Transfer books will close on Monday, December 29th, at 1 o'clock P. M.

A. F. FREY, Secretary.
Office--632 Sacramento street, San Francisco, California.

PRINTING We furnish all stock and do printing at the following prices: 100 envelopes 40 cts., 500 \$1.25, 1000 \$1.75. Bill heads, note heads, cards, tags, etc., at same price. Samples of work free. **Pacific Commercial Co., 325 Davis St., San Francisco, Cal.**

THE MACHINERY DEPOT OF THE WEST
The S. H. Supply Co.
22ND AND LARIMER STS., DENVER, COLO.

MINING AND SCIENTIFIC PRESS

Whole No. 2213.—VOLUME LXXXV.
Number 25.

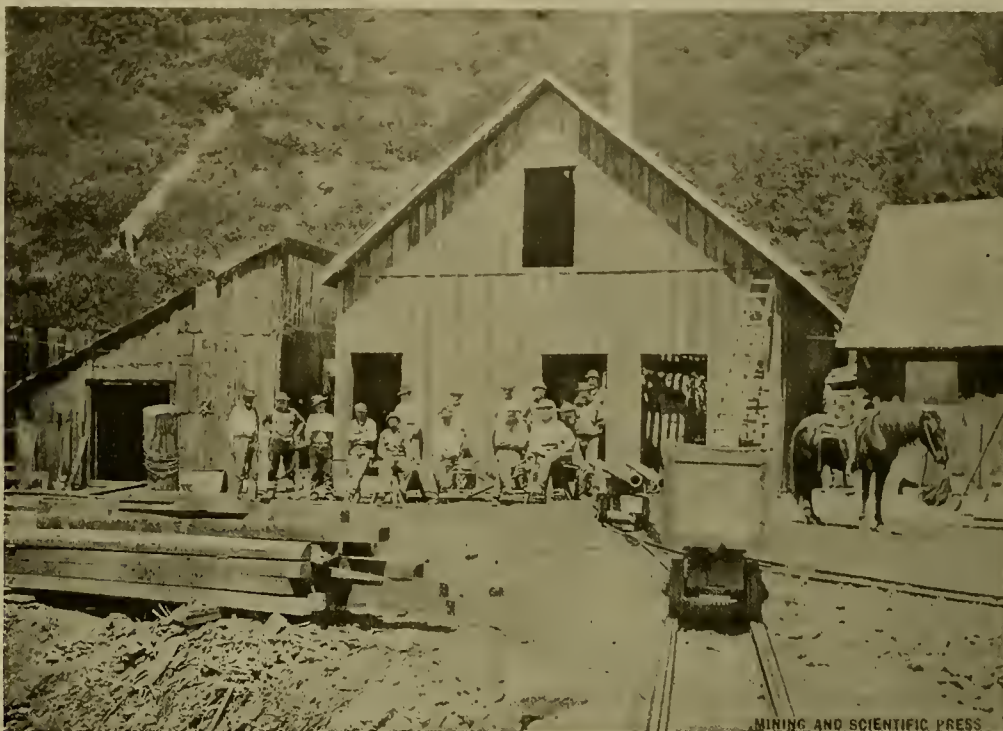
SAN FRANCISCO, CAL., SATURDAY, DECEMBER 20, 1902.

THREE DOLLARS PER ANNUM.
Single Copies, Ten Cents.

The Chloride-Bailey Mines, Trinity County, Cal.

Noted among the gold mines of northern California is the Chloride-Bailey, 2½ miles northeast of Dedrick, in Trinity county. The mine has been worked for years, originally in a superficial manner, but in more recent years in deeper levels. At present a cross-cut tunnel 525 feet long is the main entrance to the mine. This follows a large dike which intersects the hornblende schist forming the country rock. The vein system is clearly defined for several thousand feet along its strike at the surface and is accompanied by dike rocks, which together with the veins cut through the dike previously mentioned. A winze has been sunk on the vein below the tunnel level by means of a hoist run by compressed air, to a depth of 250 feet. This equipment is capable of sinking 1000 feet. The vein in the lowest workings is 10 to 12 feet wide with a paystreak 5 to 6 feet wide. In the upper workings it is 3 to 4 feet. The shoot is 400 feet long. There are two mills in operation—an old 10-stamp mill near the mouth of an upper tunnel, and a new one of twenty stamps at a point several hundred feet distant from the first mentioned and several hundred feet below it. The mill is connected with the mine by aerial tramway.

At the site of the old mill a large quantity of tailings has accumulated and a seventy-five-ton cyanide plant has been built to treat them. Southwest of the old workings the vein has been discovered near the site of the new mill, an illustration of which appears herewith, and here a new tunnel has been started which will be driven by machine drills about 5000 feet to the main shoot, with the probability of encountering other shoots on its course. This tunnel



At the Mouth of the Upper Tunnel, Chloride-Bailey Mine, Trinity Co., Cal.

will reach the main shoot at a depth of 1800 feet. The other accompanying illustration is that of the building at the mouth of the upper tunnel.

The Chloride-Bailey mines have been systematically worked since their discovery, each step in the development being carefully considered before undertaken. The mine was originally worked in the oxidized zone by means of adits and short crosscuts to the vein. Homer Wilson of San Francisco, Cal., bought the property and drove the present main crosscut, developing the mine several hundred feet below any of the former workings, and the mine proved to be better than the upper workings indicated. The long tunnel from the new mill will be an expensive undertaking; but the present condition of the mine not only justifies, but demands, either the long drain tunnel or a shaft from the surface, and there can be no doubt that the tunnel is by far the better plan.

A FEW weeks ago appeared herein an article on the discovery of a method of manufacturing nitric acid from the nitrogen of the air. It is now announced that Prof. Edward O'Neill, of the University of California, at Berkeley, Cal., has found a means of abstracting cyanogen from the air, and has applied his discovery to the experi-

mental making of potassium cyanide. This process is analogous to that of making nitric acid from the air. By a long series of experiments, Prof. O'Neill has discovered that by employing a hydrocarbon vapor, such as is produced by petroleum, gasoline, coal gas, etc., in combination with nitrogen and exposing them to the influence of the electric arc, he can produce hydrocyanic acid. Potash (potassium hydroxide) will absorb a large volume of this acid and then becomes the substance known throughout the mining world as cyanide of potassium. That the discovery of Prof. O'Neill is likely to become an important one to the mining industry is at once apparent. If it is found that potassium cyanide can be manufactured in commercial quantities at a cost considerably below the present expense of manufacturing this necessary substance, the value of the discovery is almost immeasurable.

ON the 14th inst. was successfully started the new Pacific cable from San Francisco, Cal., to Honolulu, U. S. A., thence to the Philippines and China. This means much to the mining and manufacturing interests of the Pacific coast, which has long been the back door of the nation, but with instant communication with the Orient, faces around and becomes the nation's front door, so far as are concerned the countries whose coasts are washed by the waves of the Pacific. It is the beginning of the change that will convert earth's greatest ocean into an American lake.

THE MOUNTAIN COPPER Co. at Keswick, Shasta county, Cal., whose miners and smelter men are out on strike, has met a committee of the business men of Redding, Cal., which was acting as an arbiter in the difficulties, and has positively declined to recognize the union, though professedly willing to arbitrate matters on other lines. Present appearances indicate a long shut down of the entire plant.

THERE is a more general tendency toward the introduction of mechanical haulage underground in larger mines everywhere. Managers are awakening to the fact that where a large tonnage is handled it is more economical to transport by means of a continuous rope device than to employ so large a number of men as trammers.



Chloride-Bailey 20-Stamp Mill, Trinity Co., Cal.

MINING AND SCIENTIFIC PRESS.

ESTABLISHED 1860.

Published Every Saturday at 330 Market St., San Francisco, Cal.
TELEPHONE, DAVIS 771.

ANNUAL SUBSCRIPTION:

United States, Mexico and Canada.....\$3 00
All Other Countries in the Postal Union..... 5 00

Entered at the San Francisco Postoffice as second-class mail matter.

Chicago Office (Telephone, Harrison 73) 737 Monadnock Block.
Denver Office (Telephone, Olive 733)..... 606 Mack Block.

J. F. HALLORAN..... Publisher.

San Francisco, December 20, 1902.

TABLE OF CONTENTS.

ILLUSTRATIONS.—At the Mouth of the Upper Tunnel, Chloride-Bailey Mine, Trinity Co., Cal.; Chloride-Bailey 20-Stamp Mill, Trinity Co., Cal. 349. A Single Cylinder Hoist, 353. A Concentration Testing Works, 354. Square Set Timbering, Ironsides Mine, Phoenix, B. C. 355. Orinoco Shaft, Leadville, Colo.; Bon Air Shaft, Leadville, Colo. 356. Mining and Metallurgical Patents, 357.

EDITORIAL.—The Chloride-Bailey Mines, Trinity Co., Cal.; Manufacturing Nitric Acid From Nitrogen of Air; Cable from San Francisco to Honolulu; Strike at Keswick, Cal.; Mechanical Haulage Underground, 349. Opposing the Demonetization of Silver; The Iron Market; Is Granite a Mineral? A Process for Low-Grade Ores; The Dam Across the River Nile; Timidity in Mining; Forest Examination; Threatened Destruction of North Temperate Zone; Union of Zinc Miners; No Consolidation of Gold Mines, 350.

MINING SUMMARY—352-359-360-361-362.

LATEST MARKET REPORTS—362

MISCELLANEOUS—Concentrates, 351. Electricity in Mining; Essential Mining Method Required; A General Principle of Profit, 32. A Single Engine Hoist; A Dry Process for the Treatment of Complex Sulphide Ores, 33. Principal Telluride Minerals; An Ore Concentrating Plant, 354. Mine Timbering in the Old Ironsides and Knob Hill Mines, 355. A Study of Amalgamation Methods With the Object of Avoiding the Loss of Mercury; Making Dump Room; The Bon Air Shaft, 356. Mining and Metallurgical Patents, 357. Personal; Commercial Paragraphs; Books Received; Catalogues Received; Obituary; New Patents; Notices of Recent Patents, 362.

THE MINERS and foreigners of Mexico are strenuously opposing the demonetization of silver, and the consequent increase in price of the necessities as well as the luxuries of life.

THERE is no better index to the general business and financial condition of the country than the condition of the iron market. It is the thermometer or barometer of our industrial life.

THE United States Supreme Court is hearing argument in a case involving the question whether or not granite shall be considered a mineral. This is in the case of the Northern Pacific Railroad vs. J. A. Soderberg of the State of Washington, defendant having located a granite quarry on railroad land. The railroad people are endeavoring to prove that granite is not mineral, with what success remains to be seen.

THE MINE OWNERS of Butler, in the Tonopah district of Nevada, are seeking a process which will cheaply reduce the complex low-grade ores from the lower levels of their mines. The high-grade ores afford no problem, as these can be shipped. There is no doubt a solution can be found to accomplish the desired end, if not already found in the process described in the MINING AND SCIENTIFIC PRESS of the 13th inst. under the caption of "Cyaniding Silver Ores," but an equally serious problem confronts the district in the scarcity of water. Ingenuity and the value of the ores of the district will also solve this problem. It is not unlikely that in depth the mines of the district will themselves supply all the water required. They will be fortunate, indeed, if they do not find too much, as is often the case when desert mines do reach the water line.

THE great dam across the river Nile in Egypt is completed. It is one of the finest examples of successful engineering in modern times. The foundations are laid in a deep trench cut in the granite bedrock. In the construction of the dam the presence of the islands in the stream was taken advantage of and temporary dams built, the water being pumped out below to permit the excavation of the trenches and the laying of the foundations. This process was repeated three times. The dam has a length of about 6500 feet and is 60 feet wide at the top. It is estimated the dam will impound 100,000,000 tons of water. This structure has cost the British Government about \$25,000,000 and will make it possible to irrigate a large area—nearly 800,000 acres. It will also increase river and railway traffic by reason of increased production in the region. Twenty-five thousand laborers were employed in the construction of the dam, working night and day.

Timidity in Mining.

That there is any substantial reason why capital should be timid or fearful in engaging in legitimate mining is not apparent. Monied men engage vigorously in other pursuits—manufacturing, merchandising, farming, etc.—without hesitation, when to the impartial and capable observer there seems to be no more assurance to the investor in these several lines of industry than there is in investing in legitimate mining. So often have the phrases, "Mining is a gamble," "Mining is unsafe," or, "Mining is a lottery," been repeated that the average capitalist who has not learned from practical experience that mining is not more of a gamble, or a lottery, or less secure than the average of other pursuits and investments, has come to firmly believe these sayings to be absolutely true.

There are many millionaire miners who have made their money in the mines, who do not agree with the conservative capitalist, who is conservative as to mine investments only.

Industrial failures, crop failures and merchandising failures are of no less frequency than mining failures where they were based on common sense. As a matter of course there is a wide range in the character of mining investments. Those who are seeking an investment as secure as government bonds will buy stocks in mines which have been operating successfully for many years, where the output is steadily maintained; where dividends are as regular as the changes of the moon, and where the management has been proven to be efficient and conservative. Prominent in this class are such stocks as the Calumet & Hecla of Lake Superior and the Homestake of South Dakota. In the next class are those which pay dividends, but which have not been in operation a sufficient length of time to secure absolute confidence, but which still give abundant evidence of ability to maintain their record, and in time promise to take place with those of the first class.

A third class is of the transitory sort, but which withal form an almost irresistible attraction to the investor. Among these there are many mines which have had meteoric careers, bursting suddenly into view, quickly making millionaires of comparatively poor men and rapidly waning until almost lost to sight. This class of investments is all right for those who get in early, but often disastrous to those who come in on the crest of the wave of its prosperity. They are likely to be swept to destruction by the undertow of shrinking values.

Another, and somewhat different class, and certainly a class that is recognized by those most competent to judge, as legitimate and as safe as any other unproven enterprise, is the prospect which promises well. By a promising prospect is meant a property wherein the values and economic conditions insure success if they continue, and wherein the only element of uncertainty is the extent of the ore bodies and their value beyond the point of development. By approaching this class of investment in a common-sense manner with the aid of competent assistance, which should be of the highest integrity, disaster is a remote contingency.

To plunge wildly into such an investment, equipping a shallow shaft with heavy and expensive plant, building immense mills or smelters where testing works or small plants only are advisable, will often place the investor upon the high road to failure. Without being "penny wise and pound foolish," plunging is not good business in mining or in any other branch of industry.

It is the "wildcat" investment that the capitalist must handle with caution. There are numerous "wildcats" in the market, and, unfortunately, many investors are led into investing in them to their sorrow. Even a "wildcat" is not always to be "turned down," for these are sometimes alluring, with reasonable chances that an investment of this class may prove a success. A property having little or no development may lie contiguous to a valuable mine, wherein the indications are that the ore bodies will extend into the adjoining property. Such an investment makes a good business proposition, but should be approached with caution. The Consolidated California and Virginia, on the Comstock, was just such a proposition. Nothing within itself developed, but having good mines on either side of it, the good judgment, courage and business sagacity of J. W.

Mackay and his associates led them to the greatest bonanza the world has ever known.

But there are "wildcats" that will always remain "wildcats," and to distinguish among the numerous mining propositions offered the public in these days of mining and industrial prosperity—to separate the wheat from the chaff—the average investor should take means of ascertaining from some other source than the promoters the character of the enterprise under consideration before investing.

Capital is timid, but there is no reason why it should be more so in mining than in any other business, if the capitalist will investigate the proposed investment with the same care and caution he would employ if he were about to buy a foundry, farm or merchandising establishment.

FOREST examination in the mining regions of the United States became a part of the work of the U. S. Geological Survey some time ago. The result so far indicates that of forest denudation 90% is due to fires and 10% to legitimate timber cutting. To preserve the forests for the use of the miner and rancher is the province and purpose of the U. S. Geological Survey, the governmental policy being to protect and foster the mining industry, though public sentiment does not always accept this fact. Another branch of the U. S. Geological Survey has to do with the collection of statistics of mines, mining and mineral production, which is also of great present value to the mining industry, the statistical volumes issued by this branch of the survey being accurate and timely and are the subject of world-wide commendation. Next to the Geological Survey, the General Land Office has considerable to do with the miner, through the local land offices and accredited Federal agents. The topographic and map work, which is admirably done, is also an important adjunct to the development of our mineral resources.

THE THREATENED complete destruction of the entire north temperate zone by the re-encroachment of a vast ice sheet from the north is a contingency so remote that even the prophets of evil themselves have no immediate fear of it. That such a thing as a return of the ice is possible, no one familiar with the broad principles of geology will deny, but great geological changes do not occur in a day. They require many thousands of years for their accomplishment. The uplifting of a mountain chain is scarcely more rapid than the destruction by erosion of one already built. Many centuries would come and go before sufficient snow would fall in the north frigid and north temperate zones to a depth sufficient to again form an ice cap which by the superior thickness and weight of its northern portion would cause its southern portion to slowly but irresistibly encroach upon and destroy all that now exists in the north temperate zone.

THE zinc mining companies of Joplin, Mo., district have united for the purpose of exporting several thousand tons of zinc ore, with a view to creating a raise in price. The same result might be attained by a combination or agreement among the several companies to apportion the output according to the ability of each mine to produce ore, as was done in the quicksilver mines of California. This to some extent prevents overproduction and has a tendency to keep up the price of spelter. Closing down of the mines for short periods to restrict output is a less satisfactory method, perhaps to the mine workers, as in order to work in the most economical manner, each mine should be run to the extent of its capacity. It seems, however, to be a choice between overproduction and low prices, and restricted production and better prices.

IN THIS DAY of gigantic trusts and mergers no attempt has yet been made to form a consolidation of the gold mines of the world. Doubtless this has received some thought, but the undertaking is too large for ordinary financiers who only deal in the "hundreds of millions class" of securities. But men of the Cecil Rhodes stamp—men with the world idea—are likely to undertake the huge task of controlling the gold output of the world, and there are such men in America. The "gold mine trust" would of necessity be the brightest and greatest star in the galaxy of syndicates, trusts, combines and mergers.

Concentrates.

ALABANDITE is manganese sulphide—iron black in color. It is rarely met.

WATER POWER under 485 feet head will give about 1 H. P. per miners' inch employed.

E. H. BENJAMIN is secretary of the California Miners' Association, address 331 Pine street, San Francisco, Cal.

LITHOLOGY is the science which treats with rocks as mineral masses, particularly with reference to their microscopic character.

LARGE quantities of pyrrhotite occur in copper and gold mines in California, but these ores, as far as known, carry only traces of nickel.

OXIDIZED ORE containing gold to the value of \$100 per ton or more sometimes affords no visible trace in a pan or bonspoon upon vanning.

If all of the interstitial spaces in a box of well-shaken sand were to be filled with pure cinnabar the ore would carry about 60% of that mineral.

MELONITE (telluride of nickel) was first discovered in the Melonea mine, Calaveras county, Cal.; hence the name. This ore is of rare occurrence.

BATTERY WATER may be heated in mills where steam is used by passing the water through a heater in which the exhaust steam of the engines may be utilized for this purpose.

It is stated that at Cananea, Mexico, copper is produced at an average cost of 6½ cents per pound. This must necessarily vary with changing conditions, both above and below ground.

It is always economy to cover exposed steam pipes whether for long or short distances. Where steam is conducted underground in pipes the necessity is greater for proper covering than elsewhere.

SO FAR as known neither hypersthene or any of the other pyroxenes carry nickel, and volcanic rocks containing rhombic pyroxenes are not a natural habitat for nickel ores, unless the ores occur in veins in these rocks.

In the construction of a quartz mill steel plates placed above the chutes on the inside of the bin will be found to be economical. The plates should be 2 feet wide and 3 feet long at least, and will save the wearing out of the planking of the bin.

TIN and mercury are peculiar in that the oxide ore of the former, casiterite, is found in the deepest portion of tin mines, far below the water line, and that the sulphide of mercury is found in the outcropping rock as well as in the deepest portion of the deposit.

THE Federal law does not permit the building of any submarine structure which shall become a menace to navigation. Tunnels or other conduits passing beneath rivers, lakes or other bodies of navigable water, must be constructed under the bed of such body of water.

THE best method of "killing" powder smoke in underground workings is to have an abundant supply of pure air driven into the mine, under a pressure which will send it to every face and stope. Other methods—spraying with water, etc.—only give partial relief.

THE coarseness of crushing in cyanide operations can only be decided by careful experiment. The fact that your neighbor is able to get high extraction by coarse crushing does not signify that you may be equally successful, though apparently your ore may be similar.

A DISCOVERY may be made anywhere within the boundary lines of a mining claim—that is, the boundaries may be fixed without any reference to the point of discovery; but the law requires that the claim be located in such manner that the vein shall pass along its center.

It has been stated that the occurrence of native quicksilver in a mine is an indication of its approaching exhaustion in depth. It is a fact that the native metal is usually found in the lower portion of an ore shoot, but it does not necessarily follow that a second shoot may not occur in greater depth.

A DOUBLE-CYLINDER hoisting engine, 12x20 inches, running at a speed of 175 revolutions per minute, with a piston speed of 583 feet per minute, and with boiler pressure of 100 pounds and cylinder pressure of forty pounds, will develop 160 H. P. If the speed be increased in the engines the power will be increased.

A MINER in Mariposa county, Cal., who found difficulty in saving gold in panning, because of its being "greasy," mixes ashes with the gold-bearing dirt in an iron tank, and water being added, a fire is built under the tank, heating to the boiling point. The water is drained off and panning then becomes easy, the gold being saved without difficulty.

FLAT BINS for ore are seldom justified, as the ore will never run when the slope has reached less than 35°. After that all of the ore remaining in the bins must be shoveled at a cost varying with the character of the material and the size of the bins. In a flat bin having a capacity of 1000 tons not more than one-half will run to the chutes. All the balance must be shoveled.

A CONTACT VEIN is one occurring between walls of dissimilar character, as limestone and quartzite, or slate and greenstone. Lenticular ore bodies are lens-shaped in form, that is, thickest at the center and thinning out toward the edges. They may be either great or small as to size. The California State Mining Bureau, San

Francisco, Cal., will determine rock specimens from California free of charge.

TO FIND quantity of air required for the complete combustion of one pound of coal of given composition, let the constituent carbon, hydrogen and oxygen be expressed as percentages of the total weight of the coal. To the carbon add three times the weight of the hydrogen, and from the sum deduct four-tenths of the oxygen. Multiply the remainder by 1.52, and the product is the quantity of air at 62° F. in cubic feet required.

THE dust taken from the condensers at furnaces of quicksilver mines contains a large amount of mercury. It is intimately mixed with the black dust or lamp-black. To separate the metal from the dust it is mixed with wood ashes in a shallow trough-like depression in a cement floor and vigorously raked. This causes the minute globules of mercury to unite and flow in a stream to a catchment basin. A high percentage of the mercury is thus removed.

PLATINUM ORE is of somewhat uncertain occurrence, although there are several reports of its discovery. In the State Mining Bureau, San Francisco, Cal., is a rock specimen from New Zealand, which is said to contain platinum. This peculiar and very valuable metal is found in the placers of many countries. It is usually, if not always, associated with gold, due to the high specific gravity of both metals. That platinum does not exist where gold is found is not known to be a fact.

FIFTEEN miners' inches under a head of 50 feet will furnish only 1.8 H. P., and would not supply sufficient power for a 3-stamp mill. When 200 inches or more of water are available under the head sufficient power would be generated to run an electric dynamo, and sufficient power transmitted for the purpose. Unless 200 inches or more of water are available the greater portion of the year, the installation is inadvisable. Any impact wheel will give satisfactory results if properly installed.

THE law of eminent domain is inapplicable to the case of a passage of a private tramway of whatever sort over the lands of another. In respect to the transportation of mine products, it has been held that a mine owner cannot condemn land for a railroad (or other means of transportation) to be used exclusively for the product of his own mine. This rule has been announced by the supreme court of Colorado. The only apparent way to overcome the difficulty is by lease or purchase of a right of way.

"SPAR" generally refers to some variety of feldspar of which there are several. The most important being orthoclase (potash feldspar), which is an important constituent of granite, and plagioclase (lime-soda and soda-lime feldspar). These latter graduate, one into the other, and are essential constituents of many basic and acid eruptive and volcanic rocks. There are also several other kinds of "spar," as calc spar or calcite (carbonate of lime); heavy spar, or barite (sulphate of barium); fluorspar (calcium fluoride), etc.

PROSPECTORS are likely to be deceived in the value of their copper-bearing ores. The percentages of copper contained in the numerous kinds of oxide, carbonate, sulphide and other ores of copper as stated in text-books has reference to pure samples of each sort of mineral and permits of no gangue or other foreign substance being considered. Pure minerals of the copper class do not usually exist in large quantities, but are found disseminated in grains, flakes and veinlets throughout the rock, or only increasing the cracks and cleavage faces.

THE Homestake mine, Lawrence county, South Dakota, was discovered in 1876, developed in a superficial manner by the original locators and sold. What is known as the Homestake really embraces a large number of claims surrounding the original location. The original Homestake Co. assessed stockholders only \$200,000 in four 50-cent assessments, since which time the combined mines have paid millions in dividends. The first Homestake mill contained thirty-five light stamps. The first mill with heavy stamps was the original Homestake Co., built in 1878.

THE diamonds of South Africa are found in a dark basic rock of which olivine is a prominent constituent. The diamonds of Brazil, South America, are found in conglomerate, and in the alluvial resulting from its disintegration. The diamonds of California have only been found in placers, thus far, and no knowledge of their original matrix or gangue has been gained. The ancient river channels in which diamonds are found in California also contain a white micaceous sandstone, slightly flexible (itaacolumite). This peculiar rock also occurs in the diamond fields of Brazil.

GOLD and silver are usually each present in an ore containing either. The method of separating these metals by use of boiling nitric acid has long been known, but at the time of the sixth and twelfth Egyptian dynasties the art of parting the silver from native gold was not known. Some gold leaf of the Persian epoch was pure, the silver having been separated. As, however, there is a period of about twelve centuries between the dates of these two specimens analyzed, specimens of intermediate dates must be examined in order to ascertain the date of this metallurgical discovery.

CALIFORNIA placers have produced a number of nuggets of large size. The largest reported from Placer county weighed eighteen pounds and ten ounces, and was found at Michigan Bluff. Much larger masses have been found in pocket mines than have ever been found in the placers. A notable instance is that in the Bo-

nanza mine at Sonora, Tuolumne county, where a single pocket is reported to have yielded \$360,000, the central mass of which contained more than \$40,000 in gold without gangue. Other large nuggets are reported from Carson hill, in Calaveras county, Cal., but the record is indefinite.

A BOILER may generate steam with great economy, and owing to the steam being wasted by improper application to the work through the engine, the result in work be very unsatisfactory and the boiler blamed unjustly. On the other hand an engine may be very economical in its use of steam, and yet the advantage derived from this source be more than offset by the wasteful operation of the furnace or boiler or both. The efficiency of the steam plant should not be measured by that of either boiler or engine alone. The whole plant from ash pit to exhaust pipe should be taken into consideration.

IRON has been made direct from ore by what is known as the Eames process, natural gas being employed as fuel. In this process the iron ore was pulverized and mixed with ground coke, which had been dipped in clayey water and dried. This mixture is spread on the hearth of a reverberatory furnace when the blast burning natural gas is turned on. The iron becomes intensely hot on the surface of the layer and is collected by workmen who, with iron rods, roll it up in balls much as wet snow is rolled to form snowballs. These balls are placed in a squeezer and form what are known as "blooms." This process forms a high grade of iron. That crude petroleum might be substituted for natural gas in this process seems a rational conclusion.

OIL TANKS that are full never explode, as the oil is not explosive. It is the gas generated by the oil that explodes, and a tank nearly empty containing explosive gas would create a more violent explosion than one nearly filled. All crude oils as well as refined oils used as fuel are dangerous when heated, though some are much more so than others. The relative safety of various oils can be determined by slowly raising the temperature of the oil in a basin or other suitable vessel and applying fire. The temperature at which the gas arising from the heated oil will flash upon the application of fire is called its flashing point. Oils usually flash at a lower temperature when an electric spark is introduced than when a burning stick is applied to it.

URALITE is the technical name of a mineral resulting from the alteration of augite, and is essentially green hornblende, having the appearance, cleavage and optical properties of hornblende. Often the nucleus of the crystal is seen to be unaltered augite, having the characteristic cleavage of augite. When the augite is completely altered the secondary product will usually be mostly chlorite, though some hornblendes may have escaped complete alteration. That the original mineral was augite can then only be surmised by the character of the accompanying feldspars, if they can be determined in a rock so greatly altered. The uralite referred to herein in the issue of Dec. 6, on page 326, is an artificial product made from asbestos and similar fireproof materials and has no connection with the uralite of lithology.

COMPRESSORS can be fitted with automatic controllers which will cause the machine to stop when the air pressure has reached a stated number of pounds per square inch, and to start it up again when the pressure has gone down to a fixed limit. In the hydraulic regulator this is accomplished by the use of two cylinders fitted with pistons, arranged tandem. One piston is subjected to air pressure, the other to water. When the air pressure is greater than the water pressure it forces the water cylinder piston to close the gate on the pipe line, and, the power being cut off, the compressor stops. The air being used in the mine causes the pressure to decrease until the water pressure overcomes it, when the gate is opened and the compressor again starts up. Supplied with a device of this description, a compressor requires little attention.

THE object of the law requiring annual work is, that the holder of a mining claim shall give substantial evidence of his good faith. The labor is not required to be applied in any particular manner, so long as it is unquestionably devoted to the claim. It must not be such as to raise a question as to its purpose. This labor may be in excavating, erection of works for mining and placing machinery. Any building, machinery, roadway or other improvements used in connection with and essential to the practical development of the claim, and having a direct relation to the development of the claim, constitutes assessment work. Picking rock from the walls of a shaft or tunnel, or along the croppings of a ledge in small quantities from day to day, making tests for the purpose of sampling it, breaking and examining it under a glass, crushing it and panning it out and carrying it away and making assays of it in an attempt to find the pay shoot is not such as the law will permit to be claimed as assessment work. The placing upon the ground of machinery, lumber, tools, etc., which are not used, but subsequently removed to another claim for the purpose of doing a similar duty, as assessment work, is a sham and a fraud and will not stand. Assessment work may be done in a tunnel being driven to develop several veins, the owner doing \$100 worth of work for each claim in the group directly benefited by the driving of the tunnel. As the character of the rock varies greatly, the amount of work must be determined by the wages paid in the district or State where the claim is located, a full \$100 worth being required.

Electricity in Mining.

The application of electricity in mining and metallurgy has been given considerable attention in this journal. Electrical advance in mining operations has been made notable in recent years and the most prominent and practical of such advances have been explained and exploited in these columns. In the latest volumes published have appeared the following: In Volume LXXXI were published "Electrical Precipitation of Gold on Amalgamating Copper Plates," page 8; "Electrolytic Production of White Lead," page 35; "Electrolytic Production of Caustic Soda," page 38; "Electrical Conductivity of Aluminum," page 63; "Electric Safety Fuse," page 122; "Electric Geodetic Apparatus," page 130; "Electrically Driven Centrifugal Pumps," page 151; "Electrical Manufacture of Carborundum," pages 213, 218; "Electrical Refining of Gold and Silver," page 215; "Electrolytic Extraction of Zinc," page 251; "Electrolytic Method of Producing Ozone," page 371; "Electrical Underground Concentration," page 371; "Electricity and Magnetism," page 399; "Electrically Operated Dredger," page 431; "Electrical Machinery in South Africa," page 494; "Electrolytic Deposition of Gold," page 504; "Electrolytic Production of Copper," page 530; "Electrical Extraction of Mercury," page 580; "Electrical Generator Applied to Car Truck," page 591. In the same volume may be found many other articles on the same subject illustrated. Among these are "Electric Mine Hoists," page 433; "Electric Mine Locomotives," page 567; "Electric Furnace," pages 123, 219, 282, 375, 438, 494; "Electric Lamp for Miners," page 282; "Electric Power on the Comstock," page 490; "Electric Sinking Pumps," pages 89, 92.

The above are not one-half of the articles regarding electricity in mining and metallurgy that might be enumerated as having appeared in that volume.

Volume LXXXII gives further evidences of the attention given this important subject. Among the practical and technical articles on that subject in Volume LXXXII may be mentioned that on the "Electric Amalgamator," page 126; "Electric Firing of Explosives," page 71; "Electric Furnace," pages 7, 94; "Electric Haulage in Mines," page 259; "Electric Power Generation at Coal Mines," page 209; "Electric Mining Methods in Colorado," page 47; "Electric Ore Concentrator," page 170; "Electric Reduction of Metals Under Water," page 59; "Electric Transmission," pages 2, 70, 112, 145, 199, 209, 259; "Electricity in Mountain Mines," page 241; "Electrolytic Deposition of Gold and Silver," page 126; "Electrolytic Gold Saving in West Australia," page 262; "Electrolytic Recovery of Metals," pages 135, 283; "Electrolytic Refining," pages 61, 84, etc.

In Volume LXXXIII is found further wealth of valuable information on this important subject. From the various articles thereon may be cited "Electric Bell System for Mines," page 270; "Electric Burner for Blast Furnaces," page 214; "Electric Coal Mining Machine," page 184; "Electric Copper Refining," page 109; "Electric Furnaces," pages 90, 165; "Electric Haulage in Tunnels," page 227; "Electric Hoists on the Comstock," page 56; "Electric Mine Locomotive," page 56; "Electric Mining Machine," page 268; "Electric Power in Hidden Treasure Mine, Placer County, Cal.," page 241; "Electric Pumping, Possibilities and Limitations," pages 154, 164, 174; "Electric Smelting Furnace," page 7; "Electric Welding of Pipes," page 220; "Electrical Installation Crown Mountain M. Co., Dahlonega, Ga.," page 45; "Electrical Precipitation of Gold," page 33; "Electrical Reduction of Iron Ores," page 139; "Electrical Transmission Advantages Over Mechanical Transmission," page 268; "Electrical Transmission of Energy of Coal," page 107; "Electrolysis Applied to Reduction and Refining of Copper," page 244; "Electrolytic Apparatus for Treating Metals," page 57; "Electrolytic Process for Refining Lead," page 68; "Electrolytic Apparatus for Extracting Precious Metals," page 111. Did space permit the list might be greatly extended.

For instance the article on electricity in connection with the operation of a gold dredger, written like others especially for this journal, cost over \$100. It will be found with the illustrations (which were drawn and engraved especially for this journal) on pages 183, 194, 204, 216, 228, 242 and 260 of Volume LXXXIII.

The same remarks hold true of Volume LXXXIV, in which are the usual number of specially prepared articles on electricity as applied to mining and metallurgy, showing the intelligent attention bestowed thereon by this journal. "Electrically Operated Mine," pages 169, 176; "Electricity in Mines," page 73; "Electric Mining Locomotives," pages 131, 155; "Electric Motors for Power Drills," page 201; "Electric Powder Thawer," page 258; "Electric Power Plants of the Pacific Coast," pages 330, 334, 355; "Electrical Roasting Furnace," page 294; "Electrical Sluicing of Ore," page 31; "Electrical Triplex Pump," page 245; "Electrically Driven Centrifugal Pumps," page 75; "Electrically Driven

European Mining Plants," page 259; "Electrically Lighted Mine," page 17; "Electricity in Mines," page 73; "Electric Metal Working Apparatus," page 192; "Electro-Metallurgy of Zinc," page 8; "Electrolytic Cyanide Process," page 45; "Electrolytic Deposition of Copper," pages 218, 280; "Electrolytic Production of White Lead," page 17; "Electrolytic Production of Tin," page 260; "Electrolytic Recovery of Copper from Low-Grade Ores," page 161; "Electrolytic Refining of Copper," pages 3, 215.

In the volume which closes with next Saturday's issue will be further found evidence of the importance attached to electricity in mining and metallurgy on the part of the MINING AND SCIENTIFIC PRESS. In this volume (LXXXV), the index of which appears in next week's issue, will be found among others the following: "Electrical Equipment C. & C. Shaft, Virginia, Nevada," pages 111, 115; "Electrical Power for General Purposes in Mining and Milling," pages 293, 307; "Electricity in Connection with Cyanide Process," page 322; "Electrolytic Treatment of Lead," page 264; "Electrolytic Parting of Gold and Silver," page 233; "Electrolytic Treatment of Ores or Slimes," page 91; "Electrolytic Refining of Copper," page 202; "Electrolytic Production of Spongy Lead," page 306; "Electrolysis of Fine Silver," page 3; "Electric Rock Drill," page 320; "Electro-Metallurgical Treatment of Copper Ores," page 208; "Electro Three-Phase Plant at Essen, Germany," page 269; "Electric Smelting Furnace," page 51; "Electrical Precipitation of Gold on Zinc Shavings," page 292; "Electric Power in Rhodesian Mines," page 269; "Electro-Metallurgy," page 185; "Electrolytic Extraction of Copper," page 82; "Electro-Metallurgical Treatment of Zinc Ore," page 25; "Electrical Treatment of Ores," page 193; "Electricity in Mining and Metallurgy," page 112; "Electric Power in Quartz Mining," pages 104, 111, 115; "Electric Power, Cost of," page 217; "Electricity in Mine Operations," page 234, 235; "Electro-Magnetic Gold Extraction Process," page 142; "Electric Furnace," pages 91, 185, 314; "Electricity and Compressed Air in Mining," page 173.

The above is by no means exhaustive. It is merely designed to illustrate one of the departments of mining and metallurgy to which for going on five decades this journal has given deserved attention. In this department of applied electricity as in others it leads in its line, and the above brief citation is deemed sufficient refutation to the recent Eastern assertion that "electricity in mining has been strangely neglected." Perhaps, elsewhere, but not in these columns.

Economical Mining Method Required.

TO THE EDITOR:—Under the heading "An Economical Mining Method Required," my idea would be to proceed as you recommend, but also using filling from the surface if sufficient waste is not made in the mine. Evidently this method would require too much timber for economical working, so I offer a suggestion in the following:

All the levels should be run in the foot wall and raises put up every 30 feet, and these raises connected say every 10 feet with the ore body as the work of stoping proceeds upward. As a rib of ore must be left between successive levels to hold up the waste in the level above, the levels should be say 200 feet apart.

Having in mind that the levels are in the foot wall and not in the ore the first work would be to break into the ore at every 30 feet, with say 4x4-foot holes at a 45° incline and stope the ore up for 15 feet, using stulls to stand on. When this is done continue the raises in the foot wall near the vein and break into the ore body about 5 feet below the top of the stope. Now put in stulls along the stope and make a continuous platform with 2-inch planks, and stope down 10 feet of ore, sort out the waste and let it down below the stulls to fill up space, and the ore shove down the raises into the ore chutes. The timbers are taken out as the work continues upward and used again above, so that no timbers are left in the stope. This to be continued to the surface.

If the waste is not sufficient to keep the stope filled below the stulls a raise could be run to the surface and enough waste quarried and let down the raise to fill this space. Now when all the ore above this level is taken out, the walls where not supported can cave in without doing any damage.

By this time the levels below have been completed, and the same procedure is followed, only instead of taking waste from the surface it can be taken from the stope above.

The details of ventilation, etc., will, I think, offer no great difficulties. ALGERNON DEL MAR.
Pasadena, Cal.

Further contributions to this interesting and practical subject are always in order, as it is through an interchange of ideas that the broadest knowledge is gained. Referring to the above suggestions of Mr. Del Mar, while the method suggested is ingenious it seems that it might prove a more expensive method than the Colorado mine in question can afford. It is further suggested 4 to 6-inch poles be substituted for

2-inch planks in construction of platform in the stope, as blasting or falls of rock after blasting would quickly destroy the planks. The running of filling from a stope above packed with waste into one below requiring filling is a process of extreme danger at times, owing to choking of the chutes or other openings. The run has to be started in such cases by means of powder, and it is the placing of the powder in such manner as to do effective work that makes it dangerous. Filling from the surface is always preferable when material can be obtained at less cost than when the filling is obtained underground. The superintendent must decide for himself in each case what means shall be employed to obtain filling, the cost per ton of ore extracted being his guide.—Ed.

A General Principle of Profit.

Written for the MINING AND SCIENTIFIC PRESS by CHAS. H. FITCH.

There are some things in principle, which, although "plain as a pikestaff" when attention is clearly drawn to them, remain unacted upon and as useless as though they were not true.

One of these is the making of profit in business, and the business in hand to the readers of a mining paper is the mining and treating of ores for the production of metals and merchantable minerals.

Labor produces value, and if it be employed under normal conditions in work that is commercially of value, the more labor the more profit to the manager. In a well-conducted machine shop business a profit of \$200 to \$400 a year is made on the labor of every workman employed. In the mining business this profit per person is much more variable.

Of two enterprises, each managed with about the same skill, the larger is more profitable, both positively and relatively, that is to say, the gain increases out of proportion with increase in size. The conduct of two such businesses in comparison may be likened to the conduction of steam through pipes. A 4-inch pipe carries sixteen times as much heat power as a 1-inch pipe, while it only has, roundly speaking, four times the exposure to loss by radiation. Steam is, therefore, carried with less loss in large pipes, and the saving is good clean profit.

Labor is the profitable thing; it is the measure of all value, and the thrifty use of it is the very first consideration of wise management. There is nothing more profitable than to employ a man provided you can do it under commercial conditions unless it is to employ advertising space in a paper which has a good circulation among buyers.

There are no buts or ifs about these propositions. They are absolute. Every man has in his own labor the nucleus of the best business proposition in the world. Most men think meanly of it, and their labor suffers accordingly, but if a man alive to the fact that his labor is a mine, a treasure and an expandable asset, seeks by all means diligently to improve it; he gets his salary raised. If he has been saving 20% on his previous salary and gets a raise of 20%, prudently continuing his old habits of living, he will increase his savings, and if he were a stock company he would increase his dividends 100%, and that would be an excellent stroke of business.

Brains applied in business always pay. Brains are the kind of intellectual labor which make manual labor more extensive and efficient. If a man by hand work will make a gun in two weeks, and by using his wits as did the elder Whitney, will devise a system and machinery by which 300 men and boys will make 1800 guns in a week the profit is, roundly speaking, not upon the labor of 300 persons as compared with that upon the labor of one person, but it is the profit upon the labor of 3600 persons as compared with the profit upon the labor of one person. We see how the profit upon the employment of labor is multiplied by the profit upon the employment of brains.

Vested rights may pass away or be revised by social law, but by the same natural unrepeatable law which makes labor worthy of its hire, brains are also worthy of their hire, and the partnership must command the approval of every man possessed of hands and brains.

What doth hinder us from making profit on our enterprises? We might as well come right up, blushing, if needs be, for our own shortcomings, to confront the unblushing fact that the lack of profit in our enterprises is due to lack of brains in ourselves.

And wherein have we not brains? We may have a good growth of hair on our heads, and intelligence enough under it to button on our clothes, order a meal at a restaurant, and do other useful ordinary things, but when we seek to enlarge the profits of our unsatisfactory business the fact we come up against hard is that we do not know how, and we have not force and enterprise enough to try to know how. Like the father whose boy said he was a Baptist, but that he was not working at it, we have brains, but they are not applied in our business.

We keep doing. Goethe said: "It is hard to think,

and easy to do." We do, therefore, what is easiest, and least profitable.

There have recently been made some interesting comparisons between the tin mines of Dolcoath and Mount Bischoff. Dolcoath is not prospering as it should. It has some disadvantages of outworn system, some "lord's fees" and other exactions of private and local taxation, but after all the chief thing developed by the comparison is that Mount Bischoff does and knows how to do more than Dolcoath. It appears that Mount Bischoff brains are more active, able to reach out and do more, able not only to mine tin, but to smelt it, and to smelt it not only for themselves, but for other concerns that do not know how to smelt.

The Dolcoath people give away the smelting part of the business, wit, thought and experience are not enlarged with enterprise to cover that. But they are looking at the Mount Bischoff dividends and are thinking of going to the Antipodes to learn the smelting business.

In a wider and more comprehensive use of brains, in knowing how to do more and doing it the profits lie. Of course some people attempt to do things by imitation which is the cause of most failures in metallurgical work. It comes too dear to think, so other people's thoughts are appropriated, and the substitution is not successful. The monkey with a bottle imitating the professor with a telescope got only a sousing of unpleasant fluid in his face and eyes. Shortness of applied thought is another name for shortness of profits in many cases. If we pay other people to think for us it frequently costs too dear, and if we try to steal other people's thoughts ready made, it is likely to be a bad fit.

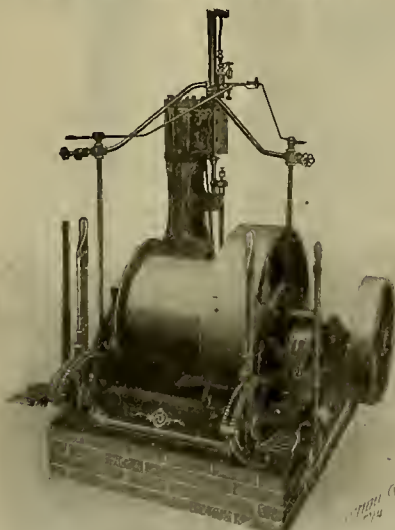
Yet the acquisition of knowledge and the mental labor of mastering a subject are very profitable. They are not easy. The inertia which opposes start and progress in this effort hangs like lead upon many mining enterprises, and its lethargic influence benumbs the minds of many young men whose future but for this shortcoming might expand like an aurora borealis.

Nor do we have to go to Wales and Tasmania for examples. It may be worth while for our own miners to take thought on something, rather than to leave the thought and the profit to others. But the idea is not enough. In the course of my acquaintance with mining affairs nothing is more noticeable than the failure of small smelting works. In going over years of sales of small smelting furnaces, it is of little use to keep after the same companies for supplies needed by a live going concern. The names are changed. The works are no longer active. The postoffices are discontinued.

It is evident that the working out of a successful proposition of this kind to meet the conditions with the ways and means at hand implies much more than the suggestion of thought. It implies hard, thorough and correct thought, with a painstaking study of fact. But thought which is thought and not mere superficial smattering and gaudy assumption remains the richest of all investments.

A Single Engine Hoist.

The accompanying illustration will give a comprehensive idea of the Freeman single engine hoist. It



A Single Cylinder Hoist.

is built for mining where operations are conducted on a moderate scale, though this engine has demonstrated its ability to hoist a 700-pound load 230 feet in forty-five seconds. One of the features of this engine is the device for throwing the engine off "dead center." It is arranged to work on the inside of the rim of the flywheel and operated by means of a lever, and does away with the necessity of having to shut off steam and run around to ride the "bull wheel" every time the engine stops on center. An air valve is so placed that air can be admitted to the steam

cylinder after shutting off steam, making it convenient for lowering men without depending wholly on the brake. Power is transmitted from the engine to the hoisting reel by means of a paper friction, the shaft of the reel working in eccentric bearings. The entire machine takes a floor space 5x5 feet. It is manufactured by the Freeman Foundry & Machine Works, Joplin, Mo.

A Dry Process for the Treatment of Complex Sulphide Ores.*

NUMBER II—CONCLUDED.

By H. L. SULMAN and H. K. PICARD.

We may point out that gold also escapes under such conditions, and it was in regard to the recovery of this metal from zinc precipitates obtained from the cyanide process that we were led to devise a method for obviating such losses. Indeed, the success of this method induced us to further apply the same principles to the treatment of complex sulphide ores. Our idea was, therefore, to treat these primarily as zinc rather than as lead ores, and to obviate the difficulties so encountered when the material is so considered.

It is necessary to draw particular attention to the rule invariably adhered to in zinc smelting, viz., to employ nothing but anthracite as mixing coal, it being supposed that the gases resulting from the carbonization of other classes of fuel causes losses in spelter. Moreover, other fuels are (reasonably) considered likely to lead to the slagging of retorts during distillation, a danger to be avoided as far as possible. Even good (roasted) blende ores always contain much slag material (Fe_2O_3 , FeS , SiO_2 , etc.), whose baneful influence it is sought to reduce to a minimum by the addition of a very large excess of coal over and above that required for reduction purposes, such excess acting as a mechanical diluent. As the amount of mixing coal used in general practice varies from 50% to 100% (on the roasted ore), it is essential that this should contain the least possible ash. Further, slagging troubles would be far more pronounced if ordinary zinc distillation of roasted Broken Hill ore was attempted; as, apart from the lead and ferrous sulphides, we have also the maganous oxide, which yields a very fluid slag with silica, and much garnet. As the result, however, of our experience in the distillation of zinc-gold material, we formed the opinion that the use of a strongly coking coal would, by holding dangerous materials suspended in its pores, overcome the objections to the presence of lead and other slag formers and permit of the distillation of complex blende-galena ores as ordinary spelter-yielding material. In this factor alone has lain our main departure from previous methods, and extended practical trials have proved our anticipations correct. It is unnecessary here to further trace our progressive trials, and we now consider the completed process.

It commences with the usual preliminary roast of the crushed ore, slimes or zinc-lead concentrates in a reverberatory furnace to a product which shall contain, preferably, not more than 3% of total residual sulphur.

The roasted ore is next mixed with only 20% of crushed coking coal and the mixture briquetted in any suitable type of machine. As a binding agent, pitch or other carbonaceous material is added; lime or other chemical binders are undesirable, as they tend to permeate the whole briquette with slagging material, and also, from some unexplained reason, to cause lead losses. Further, the admixture of a carbonaceous bond aids the bituminous coal in forming the coherent coke, which not only the distillation but the subsequent lead smelting operations demand. The briquetting plant is of a standard type, consisting of a disintegrator, into which the roasted ore, coking coal and pitch are introduced, a pug mill, press and table, together with the usual intermediate elevators and a conveyor belt for delivering the finished briquettes to the retort house.

The briquettes are then submitted to distillation in an ordinary zinc retort furnace. Those used by us at the Emu Works in South Wales are of the old-fashioned hand-fired Welsh-Belgian pattern, without regenerators, and using hand-made pots. Each contains 144 retorts in six rows, the lowest being cannon pots; a retort takes about fifteen briquettes, the total capacity of a furnace being seven tons.

This type of furnace is, nevertheless, not the most suitable for our requirements, as six rows of retorts one above the other can not be uniformly heated by bottom firing. The lower row of cannons is apt to be damaged by excessive heat if the uppermost rows are to receive an adequate temperature; too sharp a heat is also detrimental to the best extraction. In most spelter works employing this type of furnace the difficulty is avoided by using the lower rows for the distillation of "hard" material (roasted blende), while the upper are employed for "soft" (calamine) ores. On uniform material such as we treat a compromise must be effected; we therefore work to ob-

tain the best results from the three intermediate rows. These give us a 70% zinc recovery on a 26% briquetted ore, while the lower and upper rows yield a few per cent less.

For these reasons the gas-fired three-row type of furnace has been adopted for our process at Cockle Creek, as it permits of absolute uniformity of heating, and, therefore, of the maximum recovery. Hydraulic-pressed retorts, so universally used on the Continent and in America, are also employed in Australia. In ordinary zinc smelting practice the roasted ore and anthracite duff are hand-mixed in front of each furnace, the damped powder being then charged into the retort; by our method the mixing is more efficiently performed in the briquetting plant, and the charging of the briquettes more easily effected by means of a shaped iron paddle.

Once charged, the procedure for the recovery of the zinc is identical with ordinary practice, although the action within the retort is of a different character. The briquettes, as they reach the temperature of distillation of coal, coke into coherent masses, with evolution of volatile hydrocarbons. Reduction of the lead simultaneously occurs, the minute metallic particles entirely permeating, and being held up in the pores of the coke; while at the higher temperature shortly afterwards reached, zinc oxide is reduced, and yields metallic zinc vapors, which are condensed in pipes; these are tapped at intervals in the ordinary way. The distillation occupies the normal time.

We draw attention to the remarkable fact first noticed at the outset of our experiments, now confirmed by some years' experience, that, whereas in ordinary practice lead distills to a marked extent in zinc vapors, in our process the whole of the lead, as also the silver and gold, is retained by the coke. The latter thus appears to exert an actual physical retardation of the volatility of lead in a slow current of zinc vapor. So definite is this advantage, that we find the spelter thus produced from Broken Hill ores to be of exceptional purity, averaging 99% of metallic zinc and commanding prices equal to that of the best brands produced from lead-free ores. This spelter is already in considerable demand, owing to its low lead tenor, which does not often exceed $\frac{1}{2}\%$; it can thus be employed for the manufacture of the finer kinds of brass for which the ordinary brands containing from 1% to $2\frac{1}{2}\%$ of lead are useless.

The zinc having been recovered, the seconds are withdrawn from the pots (pipes and luting clay having been removed and sweeps collected) and discharged into the caves, whence in usual practice they would be dumped. But the seconds resulting from the treatment of such complex sulphide ores still retain the major values, in the shape of all the lead and silver originally present. These are obtained in the coked briquettes in a form eminently adapted for recovery in the subsequent lead smelt. The zinc retained in the seconds does not exceed the amount allowable in ordinary practice and presents no difficulty in obtaining of the usual bullion recoveries. The residual carbon in the seconds is, of course, a considerable source of heat in the after smelt and it therefore is not lost as it is in the case of ordinary zinc seconds.

By this simple operation we are enabled to convert a complex ore into a simple silver-lead product, amenable to normal reduction methods, having already recovered the bulk of the hitherto objectionable zinc as high quality spelter. The final operation for the recovery of lead and silver as base bullion being the ordinary one, conducted in the usual types of plant, both in South Wales and Australia, does not call for further description here.

Indeed, we may remark that the few operations which constitute our process are all effected in well known and standard types of plant; and that no fresh item of apparatus, concerning which there might be doubt as to costs or method of working, has been found necessary. Roasting, briquetting, zinc-distilling and lead-smelting methods and costs are fully known. Throughout the operations, nothing beyond coal and binding agent and the usual lead-smelting fluxes are employed. It is somewhat surprising that so simple a method of treatment has been so long overlooked. The system is compact and permits of economies when zinc and lead-smelting processes are thus linked together, not realizable by either separately.

In general, blende ores containing less than 40% of zinc are not profitable to treat. Such if mixed with 80% of anthracite duff would yield pot material containing little more than 22% of zinc; whereas a zinc-lead concentrate, containing say 35% of zinc, requires, by our process, the addition of only 25% of mixing coal and binding material and produces a briquette carrying 28% of zinc, with the additional advantage of yielding a residue containing profitable material. It is possible to treat a 35% concentrate for its zinc alone, the lead and silver remaining in the residues as profits subject only to recovery costs; while the fuel values remaining aid in reducing these.

RECOVERIES.—Lead, silver and gold, as before stated, are recovered in the seconds in full; the lead, of course, is subject to the normal smelting losses, just as in the treatment of ordinary lead concentrates; though the Huntingdon and Heberlein and Carmichael processes claim to reduce such losses to

*Transactions of the Institution of Mining and Metallurgy.

about 2%; and we believe these claims to be well founded.

Bearing in mind the fact that the seconds hold all the lead in the metallic condition, the question naturally arose as to whether smelting was the most economical method of recovering this metal and the silver. We devoted considerable attention to the mechanical separation of the reduced lead, but unsuccessfully. The metallic particles and prills are so exceedingly finely divided throughout the carbonaceous sponge that any method of water dressing or concentration results in heavy loss; nor did oil concentration give any better results, owing to the excessive amount of carbon also taken up. On the whole, smelting was adopted as the simplest, safest and most usual method.

With regard to zinc recovery, the spelter yields are practically the same as those obtained in the ordinary treatment of blende ores. To reckon in percentages is somewhat illusory, as these depend naturally upon the original zinc contents of the ores treated. With a zinc-lead product carrying 40% of zinc no difficulty is experienced in obtaining a recovery of 80% of that amount, while, with a 25% material, 70% may safely be reckoned upon in modern furnaces. Late advices from Cockle creek inform us that the recoveries of both lead and silver in the seconds are complete, and that the zinc production already exceeds 70%, slimes averaging 25% of zinc being the raw material used. With 35% material we have every reason to anticipate an 80% recovery. The pot consumption is quite normal there; mixing coal is obtainable at lower rates than are available to us in South Wales. Fireclay of good quality for the manufacture of hydraulic pressed retorts is also available on the spot; and we have used trial lots of this material for some of our retorts in South Wales, with excellent results. The works at Cockle creek are the first producers of spelter yet installed in Australia.

In ordinary zinc practice, it is not found economical to force the extraction below a certain point, as the increased time required not only reduces the output of the furnace, but, with the higher temperature necessary, the pot consumption becomes unduly great. The zinc usually left in the seconds varies from about 5% to 8%. Our working costs are also normal; no difficulty is experienced in calcining the complex ores to the sulphur standard usually required for blende; the zinc furnaces do not demand any greater attention or further hands, while labor in retort charging and discharging is materially lightened by the use of briquetted material. Briquetting charges are, of course, additional; but are to some extent balanced by the far smaller consumption of mixing coal, and by the economical handling of material during the final lead smelt.

A point to which attention will doubtless be directed is that of pot and pipe consumption. The average life of our pots, even though used for distilling such highly refractory material, is fully equal to that of the retorts used for good blende and calamine ores according to usual methods, being from five to six weeks each. Our present consumption per day is 3.7 pots per furnace. The cost of our hand-made pots is about 6s apiece. This is admittedly high, even for England, and hydraulic pressed retorts, having a longer life, requiring less clay, and demanding a lesser distillation temperature, can be produced for 3s each.

A certain proportion of "fines" is inevitably produced in raking the briquette seconds from the pots into the caves beneath the furnace house. These are separated, damped with water, and rebriquetted for lead smelting purposes from time to time at a cost of about 2s per ton of fines.

We append a schedule of cost incurred during the late treatment of a parcel of Broken Hill slimes, averaging 25% of zinc, 24% of lead and 26 ounces of silver per ton.

CALCINING.—Hand roasting of such material to 3% of total sulphur or slightly under in South Wales costs about 9s per ton, while mechanical roasting in the Godfrey furnace amounts to about 6s 6d. Other forms of mechanical calciners, such as the Brown straight line, will roast complex sulphide ores to this limit at even lower cost; but at present the hand calciner and the Godfrey appear to yield the denser product and also to be preferable in other respects. The question of the best form of calciner is not fully settled, but we select the Godfrey costs as those most lately obtained.

COSTS PER TON OF ORE TREATED.

	S. D.	S. D.	S. D.
Ore drying.—Screening and crushing of lumps, and wheeling.....	2	6	
Calcining.—Fuel, labor, maintenance	7	0	
Briquetting.—(30 tons of roasted ore per day)—			
Labor.—1 pressman at.....	5	0	
3 belt men at.....	5	0	
2 laborers at.....	3	9	
Boilerman at.....	4	9	
Coal.—1 ton for boiler.....	32	3	
6 tons for mixing, at 8s 6d.	51	0	
Pitch.—1½ ton at 45s.....	72	6	
Stores.—Oil, etc.....	1	3	
Cost of briquetting 30 tons =	165	6	
= per ton ore.....	5	6½	

Retorting.—(Costs per furnace per 24 hours).

Labor.—2 foremen at 6s 8d =	13	4
2 second hands at 5s 6d =	11	0
2 helpers at 4s 3d =	8	6
4 cave men at 4s 3d =	17	0
1 pipe chipper (boy).....	1	4
General labor.....	5	9
Pottery.—3.7 pots at 6s =	22	3
9 pipes at 2d =	1	6
Coal, for firing 3½ tons at 9s 6d =	30	10
Stores, luting clays and repairs...	4	6
Contingencies, unoccupied pots, dead fires, etc., add 5% =	5	9½
	116	0
For charge of 7 ton briquettes = 5.6 tons of ore = per ton.....	21	9
Yard and general labor.....	1	6
Rebriquetting of "fines" at 2s per ton—Seconds contain 30% fines; on 80% of seconds =	5½	
Smelting costs on seconds (see p. 12).—(Seconds amount to about 80% on the original ore).		
Smelting per ton seconds.....	12	6
Refining, sales, brokerage, insurance, etc., at £2 per ton of hullion produced at 26% hullion.....	10	5
Per ton of seconds.....	22	11
= per ton of ore.....	18	4
Lead smelting losses—		
2.8 units of lead (= 10% on residues) at 2s 3d.....	6	4
5% silver = 1½ oz. at 2s 1d....	2	8
Office management and assays—dependent on size of installation, say.....	5	0
Total cost of treating 1 ton of ore.	71	1
Recoveries—		
Zinc, 70% (of 25%) = 17.5 units at 3.65s =	63	10½
Lead, 90% (of 24%) = 21.6 units at 2s 3d =	48	7½
Silver, 95% (of 26 oz.) = 24.7 oz. at 2s 1d =	51	5½
	163	11½
Less costs.....	71	1
Realizations.....	£4	12 10½

From which must be deducted cost of transport of slimes or cost per ton of ore.

In regard to the first four items the above costs are certainly capable of reduction.

In South Wales we have at present no lead-smelting plant for spot recovery of the seconds values, but dispose of these to local reduction works according to their assay values upon the usual scale of returning charges. The erection of lead-smelting plant at our own works is under consideration, in order to save these extraneous profits and to obviate freight to the smelters. In Australia the smelting plant is that in ordinary use for reduction of the lead concentrates, etc.

The work outlined has occupied our attention for some years past, during which we have carried

complete in all cases, while the spelter yields have varied from 60% to 80%, according to the original zinc contents.

Complex ores containing copper present no further difficulties as to retort treatment; the copper, of course, remains with the lead and silver in the seconds and is thence obtainable by modern copper-lead smelting methods.

Summarizing our process, it may be said to consist in the holding up of the minute particles and prills of reduced silver-lead in a coherent but still highly porous coke or carbonaceous sponge during zinc distillation, thus preserving the retorts from contact with lead or other slag material and insuring the all but complete non-volatility of the lead and silver in the liberated vapors of metallic zinc.

In spite of its apparent simplicity, our process has been found capable of complete patent protection in the principal countries and colonies of the world, while the grant to the United States, German and Scandinavian patents may be taken as evidence of novelty.

Principal Telluride Minerals.

Calaverite, 56%. Gold, 44%. Hardness, 2½; color, bronze yellow.
Hessite, 37%. Silver, 63%. Hardness, 2½ to 3; color, steel gray.
Coloradoite, 38%. Mercury, 62%. Hardness, 3; color, iron black.
Tetradymite, 48%. Bismuth, 52%. Hardness, 1½ to 2; color, pale steel gray.
Melonite, 76%. Nickel, 24%. Hardness, 3; color, reddish white.
Sylvanite, 56%. Gold, 28%. Silver, 16%. Hardness, 1½ to 2; color, silver white.
Pezite, 33%. Gold, 25%. Silver, 42%. Hardness, 2½ to 3; color, iron gray.
Altaite, 38%. Lead, 62%. Hardness, 3; color, tin white.
Nagyagite, 32%. Lead, 54%. Gold, 9%. Hardness, 1 to 1½; color, lead gray.
A mineral scratched by a finger nail has a hardness of about 2; one which is cut by a knife is about 5½ in the scale of hardness.

An Ore Concentrating Plant.

The illustration on this page is of a concentrating plant as erected and running in the Llewellyn Iron Works, Main and Redondo streets, Los Angeles, Cal. The plant consists of one 6-foot four-roller Elspass centrifugal quartz mill, two amalgamating tables with silver plated copper plates, one 11x8-inch Blake crusher, one belt-driven ore feeder feeding Elspass mill, one 8-inch belt elevator carrying crushed ore from crusher to feeder, two new Standard concentrators, all driven by an 8x10-inch automatic cut-off engine.

The primary object in erecting this plant was for exhibition purposes. The secondary object is its use



A Concentration Testing Works.

through a large number of experiments in the laboratory, in small works specially erected in Surrey, and finally at the Emu works in South Wales, where large scale furnaces have been running for the past year as a commercial undertaking. We have there treated over 4000 tons of Broken Hill slimes besides many other parcels of complex sulphide ores. The recoveries of lead and silver have been practically

as a custom concentrating mill for testing ores, and where the Llewellyn Co. can treat ores shipped to them to determine the values contained, or the adaptability of the ores to a treatment by concentration. Parties interested in mining and in the concentrating of ores, and those contemplating the installation of a concentrating mill are invited by the Llewellyn Co. to call and see this plant in operation.

Mine Timbering in the Old Ironsides and Knob Hill Mines.

By H. P. DE PENCIER, McGill University, Montreal.

The old Ironsides and Knob Hill mines are situated at Phoenix, in the Boundary Creek district in British Columbia, at the watershed of the Kettle river; superintendent, W. Y. Williams.

The ore bodies in these mines are very large, which fact necessitates an extensive and thorough system of timbering the lower levels of these mines. The boundaries of these ore bodies have not yet been well ascertained; the ore appears to extend over 2000 feet in length, while the width is not determined, though crosscuts from the foot wall have been run for upwards of 300 feet.

The Old Ironsides has been prospected and developed by a system of shafts and drifts, showing the ore to extend down 400 feet, though work is not being carried on below the 300-foot level. Stopping ground on the 200-foot and 300-foot levels has been opened up, exposing blocks of ore running as high as 280 feet in width by 200 feet long; also, in an intermediate level—the 250 foot—ground 160x40 feet has been blocked out and is being stoped.

The Knob Hill is worked through a long adit tunnel, along which three blocks of ore 200 feet square are blocked out on at least three sides. On the surface, 150 feet above the level of this tunnel, an open cut or quarry is operated, and delivers ore to the tram system in the tunnel by means of shafts or chutes in the solid rock.

The foregoing brief description of these mines is merely intended to convey some idea of the immense size of the ore bodies, and hence the need for timbering when the ore is removed.

The ore in this mineralized zone does not form a very strong rock, though where (as in the Knob Hill) there is not much water and it has not been shattered it forms a fairly safe roof for drifts and crosscuts.

A large part of the timber used at both mines has been obtained on the claims, the country here being rather heavily wooded. The principal kinds of wood are pine, spruce, tamarac and Douglas fir; the three latter are regarded as of nearly equal value, the fir being the strongest and all three being stronger than the pine, which, however, has the advantage of being softer and crushing more easily, so as to take up the load more evenly; for this reason pine is much used for making wedges.

Most of the timber on the claims has now been used and the supply for the future is being brought in by railway from outside points.

Posts and caps are cut from round timber, which has the bark peeled off to lessen the decay caused by moisture retained on the surface and below the bark when it is left on; this round timber is 10 inches and upwards in diameter, the posts being generally 15 inches up to 24 inches in diameter, while caps are smaller, the thickness across the flats at the post being 9 inches. Lagging poles are 5 to 10 inches in diameter.

Sawed timber is used in the construction of ore bins, hoists, and in the lining of shafts and chutes.

On the surface at both mines considerable timber has been used to build retaining walls to hold second-grade ore and for making ground about the shafts and buildings. Round timber with the bark on is used for this; it is built into a wall by means of cross-pieces, forming cribs; these pieces are notched to fit the notches cut in the logs of the wall, and are run back into the bank, where the weight of material resting against them holds the whole crib firmly in place.

Both mines are equipped with ore bins capable of holding from 5000 to 10,000 tons and intended for the storage of ore and its easy delivery from the mine to the railway cars. The foundation is made of 12-inch square timber made into bents and resting on mud-sills of the same timber; these rest on the solid rock.

The bents run crosswise of the bin at a distance of 5 feet from center to center and are strongly braced, the direction of the braces being changed in successive bents, while the bents are tied together by braces crossing three bents.

The floor of the bin comes directly on top of the bents; it is flat and horizontal; the ore takes the angle necessary for its removal.

The floor and sides of the bin proper are made of 4-inch plank, spiked solidly to the 12-inch square timber frame; 1-inch iron tie rods are freely used in addition. Along the front side of the bin a railway track is built, and above this on the bin a platform extends, from which the cars are loaded by means of a series of chutes placed 5 feet apart from center to center. The gate is made of heavy iron 26 inches wide, and is pivoted on an axle and opened by a long iron lever; two movable planks above the iron gate permit the attendant to bar out large rocks if they should stick in the mouth of the chute.

Above the main bin compartment proper the grizzlies and breaking and sorting platforms are built. The grizzlies are made of 25-pound mine rails cut to the desired length and strung, bottom upwards, on

iron rods at each end; pieces of pipe placed between on the rods make the desired space between them—about 2½ inches. There are two such grizzlies, each 5 feet wide, with an open space between them, in each 15 feet of the length of the bin. This open space is used for dumping ore directly into bin when it does not require sorting or breaking; or, by means of a chute, a low-grade ore can be thrown out of bin at the back.

Above the grizzlies is the tram car level; the cars come from the shafts to the center of the bins and turn either way on a steel turnplate and are run to the desired compartment and dumped. A beam 4 inches square, running parallel to the track, about 2 feet from it, prevents the cars being overturned into the bin.

The whole structure is roofed with 1-inch boards to keep out rain and snow, which are abundant in this locality. The bin is a small one, with a capacity of about 18,000 cubic feet, if full, or, say, 1000 tons. There are in addition two others of much greater capacity.

The shafts in operation on the Old Ironsides are the original prospecting shafts and the "gallows-frames" are not elaborate. It is built of 12-inch square fir timber. Men and timber are taken on the cage at the shop floor level, while ore or waste is hoisted to the tram floor level to be taken to the ore bin or waste dump. As the hoisting engine is quite small, an elaborate hoisting frame is not required. The frame at No. 2 shaft is similar.

Both shafts have two compartments, one being for hoisting ore, etc., and the other for ladders, pipes, etc. Owing to the fact that they are lagged inside with 2-inch plank, I have not got full details of the timber in them.

Shaft No. 1 is cribbed for a part of the way down, after the method of framing timber for cribbing which is employed in British Columbia; it is a halved joint combined with a heveled hitch on the inside to resist lateral pressure; it is improved if side and end plates are made to break joints so as to prevent one set slipping over the next.

The lower part of No. 1 shaft and all of No. 2 shaft is timbered with square shaft sets, with a halved joint and beveled hitch, and the posts resting at top and bottom in a hitch to prevent them being forced inwards. The center girt or divider is supported by a tenon and mortice joint; and center posts are provided. The lagging in bad ground is placed as usual outside of the timber and is supported on strips spiked to the plates; in safer ground the lagging is placed on the inside, being intended to prevent small rocks from falling in.

As the shafts are only prospecting ones, the level stations are simple. Posts about 15 feet long are put in the shaft at the station, and the upper end wall plates are run across the station a distance of about 20 feet, with suitable supporting posts and dividers or cap pieces; the lower end plates are also extended to form part of the sills for carrying the floor and steel turntable plates.

Both mines are equipped with a track system. The rails are carried on wooden ties placed about 18 inches apart; these ties are flat on two sides and are 3x4 inches and 30 inches long.

The main haulage roads are lighted with incandescent lights; the wires are carried on small round timbers about 4 inches thick, wedged across the top of the drifts like a horizontal stull. Where there are tunnel or stope sets, they are used to carry the wires.

The method of mining the ore in the Old Ironsides may be briefly said to be overhand stoping. The stopes thus formed are filled with square sets of timber, and this timbering constitutes the most important item in the timbering of the mine.

The square sets are of round timber 8 feet in height placed 5 feet apart, with cap pieces to hold them in their relative positions laterally. These posts and caps are securely wedged into place, to carry any pressure resulting from settling or breaking loose of rock. They are all round timbers, except the bottom sills in each stope which are 6x12-inch sawed timber. The sketches at the top of the accompanying figure show the method of framing joints; in the sketch square timber is shown, for convenience in drawing. The lower drawing shows a number of sets put together; in it the posts are represented as being too small to allow of cutting the small shoulder for catching up the whole cap. This occurs sometimes with the round timber.

It will be noted that the framing of this timber is especially designed to carry vertical pressures—the tenon on the end of the posts insuring the position of the posts in the different floors of the stopes being directly above the corresponding post in the floor below.

It will also be noted that this system of timbering is very elastic and can be applied to ore deposits of almost any shape and size.

This timber is all framed on the surface by special carpenters. The framing platform is situated in a convenient place above the shafts and below a spur of the railway, from which the timber can be unloaded and rolled direct onto the platform, framed and rolled off onto piles near the shafts.

It is cut up into caps and posts to the best advantage. Templates, straight edges and squares, are used by the framing carpenters. All timber should be marked off and measured from a center line. It may be mentioned that this method is about to be abandoned at this time and the timber framed by machinery.

The timber is transported to the shafts on a 30-inch gauge track and lowered into the mine by the "muckers" of the night shift, and stored in convenient places near the shaft stations. In this connection it may be noted that it is advisable to store it in as dry a place as possible, as the drier and lighter it is the more easily and expeditiously the heavy pieces can be handled.

From the stores underground the men of the day timber crew take it as required to the various parts of the mine on small timber trucks running on the ordinary mine tracks.

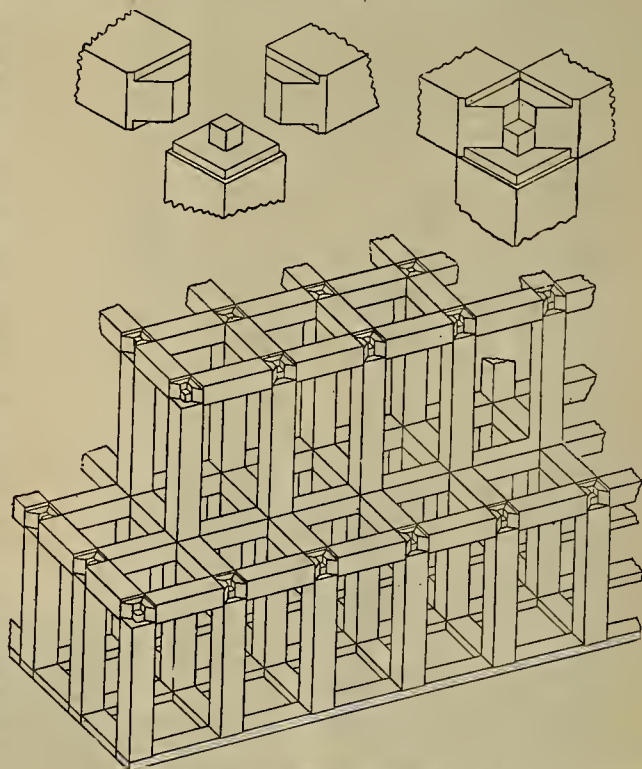
If the timber is being put in on the bottom of the stope, the first operation is to get the 6x12-inch sill accurately in place. This may be done by the engineer giving level and location with his instrument, or it may be placed by reference to the adjacent timber, if there is any, by leveling and measuring across from the sills. When the sill is tamped accurately to its true position, the sill posts are set in position in the open mortices in the sill, then the caps are put on and the whole is "spragged," or braced, and wedged securely in place. It is usual to brace and wedge caps and posts from the adjacent walls, and the roof also in the case of the caps by a large vertical sprag set on top of the caps meeting at a post.

Next the lagging of round poles is laid on top of the caps; the lagging poles are from 4 to 10 inches in diameter, 10 feet long, and have the bark left on. Not more than four square sets of lagging are laid in the same direction, i. e., a square 10 feet on the side; the adjacent lagging is laid at right angles to this to give a better support to the ends.

If the timber is to be used on floors above the track level, it must be hoisted from the level; to do this chutes are built through the lower floors; they are made either of plank spiked to the lagging or of lagging, the top being spiked to the cap and the bottom ends resting on the next floor behind the caps, so as to be out of the way of the timber being hoisted.

The hoisting engine used in handling timbers is driven by compressed air from the mine mains. This engine is in common use in British Columbia for this purpose. It is made in two sizes with double cylinders, 5 and 6 inches in diameter, and drums 12x21 inches and 14x24 inches respectively. The 5-inch engine is said to be capable of lifting 1400 pounds 100 feet per minute. The pistons are of the trunk type, there being no crosshead or slides; the crank discs are carried on the small shaft at the top; this shaft is geared to the larger shaft, on which the drum is loose, and is connected by a V friction between the drum and the large gear when running. This engine is mounted on mine car wheels, for transportation underground, and braced securely to walls and timber when used. Each engine should be equipped with air hose, wrench and oil can.

(TO BE CONTINUED.)



Square Set Timbering, Ironsides Mine, Phoenix, B. C.

A Study of Amalgamation Methods, With the Object of Avoiding the Loss of Mercury.*

By MICHAEL BUSTAMANTE, JR., M. E., City of Mexico.

I. GOLD AMALGAMATION.—In 1890 I was manager of a mining enterprise in the State of Michoacan. The ores were composed principally of iron pyrites (much decomposed), in a quartz matrix, with native gold in irregular grains. Some portions, however, carried their metallic value in a matrix of calcite and siderite. The mill in which the ores were treated consisted of two 800-pound stamps, two amalgamating plates, four pans, two automatic washers, two Frue vanners, and the necessary accessories for assaying, retorting and refining gold. The plant, originally erected with American capital, and directed by competent Americans, passed in 1890 into the hands of Mexican owners. On taking charge of the business I found on hand a large amount of ore assaying 35 grams of gold per metric ton (about one ounce Troy per ton of 2000 pounds); but the company was losing money, and was about to abandon the business.

Obviously, the difficulty lay in the treatment of the ore. The extraction of gold scarcely reached one-tenth of the assay value; the loss of mercury was considerable; and high freight charges excluded the alternative of exporting the ores.

The situation suggested that amalgamation was not applicable to these ores, and that a more appropriate method must be adopted.

The cyanide and chlorination methods had been tried without practically satisfactory results. For the first few months I employed a combined system, extracting a part of the gold by direct amalgamation and cyaniding the concentrates. This saved 32% of the assay value, but the cost of milling still exceeded the proceeds. Meanwhile I observed that on certain occasions during the amalgamation there was a very perceptible escape of hydrogen sulphide. This I could not satisfactorily explain; but, on the other hand, it accounted for the great loss of mercury which had made amalgamation so expensive and ineffective.

To remedy this (and also diminish the great quantity of cyanide of potassium that had to be used, especially when the gangue of the mineral was calcite), I began with a reverberatory roasting of the crude ore delivered to the mill, and a subsequent washing with water, until the latter came off perfectly clear. The operations of amalgamation, concentration and cyaniding were then performed as before, and the result a gold extraction of 63% of the assay value, with a loss of 11% of the mercury used.

This loss surprised me; nevertheless, under these conditions the milling of the ores began to be remunerative. On further investigation, the gold which had escaped amalgamation was found to be in a peculiar state of aggregation, reminding one of its tendency to condense some gases, provoking reaction and decomposition of the "platinum sponge." I think that the gold could be found there in another form also, analogous to so-called "black platinum."

Once this fact was discovered, the explanation of the previous phenomena was not difficult. The very finely divided sponge and black gold, coming into contact with the mercury, provoked an energetic electro-chemical action; and this decomposed a relatively large quantity of water, the oxygen of which was absorbed by the sponge, while the hydrogen, combining with the sulphur of the pyrite, produced hydrogen sulphide. Of the latter, a part escaped as fire gas, and a part attacked the mercury, producing mercury sulphide, which explains the great loss of that metal.

Of course the actual reactions are much more complicated than this rough statement; but the principal result, the formation of mercury sulphide, has been conclusively proved by analysis. The loss of the gold is also explained, whenever the sponge or black gold are present under such conditions as to operate like electro-positive element of an electric couple; that is to say, it will receive, condense and hold oxygen, and it will be returned by the electro-negative element of the couple in question.

The investigation was continued to find a method of treatment which would both reduce the loss of mercury and increase the extraction of gold. Since the gold occurred in the gangue in grains of varying size, sometimes, but not always, impalpable, it seemed impossible to dispense with amalgamation entirely. On the other hand, a subsequent cyaniding was impaired by the pulverizing with stamps, which gave a large amount of slimes, through which it was difficult to pass the cyanide solutions. Moreover, these solutions were immediately transformed into carbonates and ammonia salts, and the consumption of cyanide was excessive. Treatment with chlorine was also difficult, and by neither of the two methods was I able, in my laboratory experiments, to obtain more than 40% of the assay value.

I resolved, therefore, to continue experimentally the amalgamation, supplemented at first with cyanid-

ing, and prefaced with roasting, as above described. Having abundance of hydraulic power, I began the use, with certain modifications, of the Siemens & Halske method of precipitating the gold. This increased by 15% of the assay value the extraction of gold, and also reduced the expense of treatment. Precipitation with zinc was therefore abandoned. The increased extraction was undoubtedly occasioned by the employment of the electric current, since the treatment had not been otherwise modified, and the average composition of the ores had not changed. A comparative experiment, in which a given lot of concentrates was cyanided, and one part was treated with zinc precipitation, and the other with the electric current instead, entirely confirmed this hypothesis. In the first place 60%, and in the second 66.30% of the assay value was obtained.

Before devising a process of my own, I tried those of Body (1894), B. C. Moloy (1894), and others, without satisfactory results. Finally, after some experiment and change in my apparatus, I perfected a method by which the loss of mercury was reduced to 0.03%, and the extraction of gold brought up to 95%

amalgamating plates 2 decimeters square, and on the side walls of the huckets similar plates 0.5 meter square, united, in tension with the poles of the dynamo, in such a manner that the electro-motive power would not exceed 1.5 volt. Later, the aggregate surface of the plates was enlarged to some 15 meters square, which gave the best results. A further increase of surface would have been useless.

On an average, nine tons of ore were treated every twenty-four hours; the extraction of gold was 94%, and the loss of mercury was insignificant.

Still later experiments led to the abandonment of the preliminary roasting of the ore; and this resulted in the maximum gold extraction of 95% of the assay value.

(TO BE CONTINUED.)

Making Dump Room.

Where shafts are located on flat ground dumping room is often a matter of importance. This is obtained in various ways. Often the head frame is constructed on top of a firmly built sub-structure,



Orinoco Shaft, Leadville, Colo.

of the assay value, while the cost of treatment was lowered until it only amounted to \$0.42 per ton for crushing, and \$0.19 for amalgamation and the electric current.

At first, this method consisted in reverberatory roasting of the ore and washing abundantly with water, then passing it through the mortars, where it was pulverized and began to amalgamate. The mortars were provided with interior amalgamating plates, in communication with the poles of a dynamo that produced a current of 150 amperes, 14 volts. The two stamp batteries discharged into a common channel, in which, side by side, were placed the large amalgamating plates, one communicating with the positive pole, the other with the negative. This arrangement gave encouraging results; but in view

the waste being filled in around it. The accompanying illustration of the Orinoco shaft, at the foot of Harrison avenue, Leadville, Colo., shows the manner of securing dumping ground at that mine. The material is carried to a high point in the head frame from which it is run out on an elevated tramway. The lower portion of the head frame is inclosed with corrugated iron, forming rooms in which are located the blacksmiths' and carpenters' shops.

The Bon Air Shaft.

One of the noted shafts of Leadville, Colo., is the Bon Air, an illustration of which appears on this page. The Bon Air has always been a wet shaft,



Bon Air Shaft, Leadville, Colo.

of the energetic decomposition of the water which attended it, the electro-motive power was diminished by subdividing the amalgamation plates and uniting them, not in series, but in tension. This produced the much desired result. The liberation of gases diminished considerably, and the loss of mercury became insignificant.

Similar dispositions were made for the pans and the washers. Over the wooden shoes were placed

and several years ago attracted unusual attention by caving, at which time tons upon tons of bales of hay were dropped into the shaft for the purpose of stopping the cave. This was finally accomplished and the loose ground caught up. The large areas of ground stoped in some portions of the Leadville district has long since made surface improvements appear insecure, notably on Fryer hill, but the Bon Air seems not to have suffered in this respect.

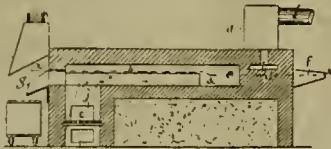
*Transactions Am. Inst. Min. Eng.

Mining and Metallurgical Patents.

Patents Issued December 9, 1902.

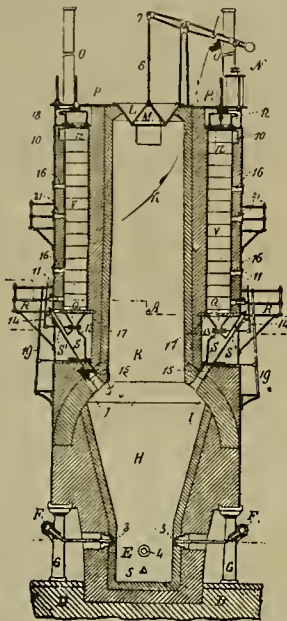
Specially Reported and Illustrated for the MINING AND SCIENTIFIC PRESS.

PROCESS OF REFINING LEAD AND ZINC FUME.—No. 715,238; F. L. Bartlett, Canyon City, Colo.



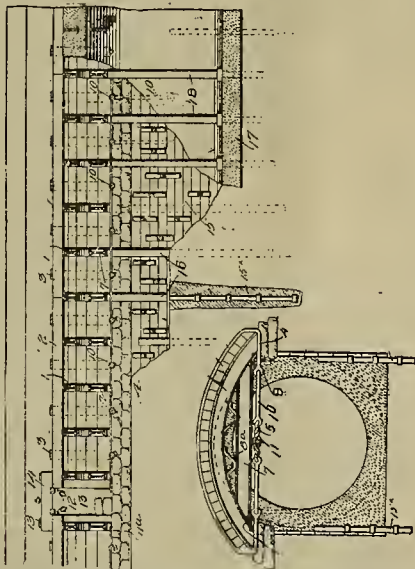
A process of refining zinc and lead fume, consisting of subjecting collected mass or body of fume at low red heat to action of products of combustion of carbonaceous fuel, stirring fume while subject to action, withdrawing it from action into suitable receptacle, allowing it to cool slowly, finally separating outer layer of fume from body of mass.

FURNACE FOR SMELTING IRON.—No. 715,269; H. A. Jones, New York, N. Y.



Combination with blast furnace having crucible for molten metal, flaring fusion chamber above crucible, cylindrical chamber above fusion chamber and of smaller diameter than upper part of fusion chamber, series of equally spaced vertical recesses in furnace wall, series of deoxidizing ore retorts in recesses, means for covering same, receiving hoppers containing deoxidized ore beneath retorts, supply hoppers connected to receiving hoppers, valves between receiving and supply hoppers, tubes extending upward from supply hoppers, through which devices may be inserted to insure proper discharge of deoxidized ore from supply hoppers, passages from supply hopper to upper part of fusion chamber, valves in passages, platforms around furnace and means for operating aforesaid valves, means for visually observing interior of deoxidizing retorts.

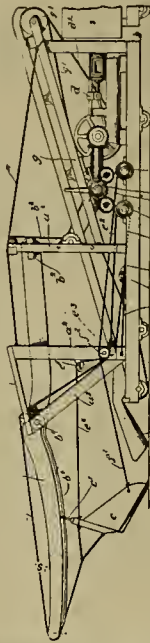
TUNNEL ROOF.—No. 715,406; J. C. Meem, Brooklyn, N. Y.



A roof or shield for tunnels, comprising plurality of arched compression members composed of I-beams

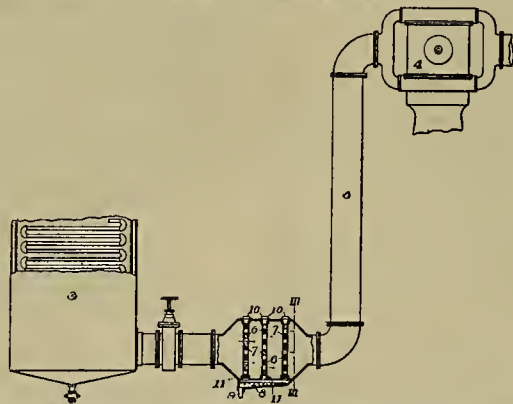
suitably spaced apart, superposed arch members, chord stiffeners associated with compression members, assembling bands encircling arch members and having terminals disposed beneath chord stiffeners, and tension device associated with terminals.

STEAM SHOVEL.—No. 715,470; F. Franz, Wallace, Idaho.



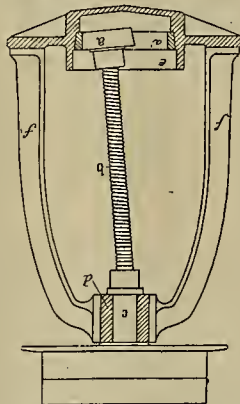
An excavating apparatus comprising frame, motor arranged adjacent to one end thereof, haul mechanism located adjacent to motor, conveyor passing at inclination upward from base of frame and over haul mechanism and motor, boom mounted on frame adjacent to receiving end of conveyor, shovel carried on boom, and connections between shovel and haul device.

METHOD OF DRYING AIR FOR BLAST FURNACES.—No. 715,366; J. Gayley, Pittsburg, Pa.



A method of drying air for blast furnace use, which consists in precipitating greater portion of moisture therefrom by refrigerating air to zero centigrade, eliminating remainder of moisture from air by bringing cold air into contact with material having affinity for water.

CENTRIFUGAL MILL.—No. 715,473; O. Gaiser, Kempton, Germany.



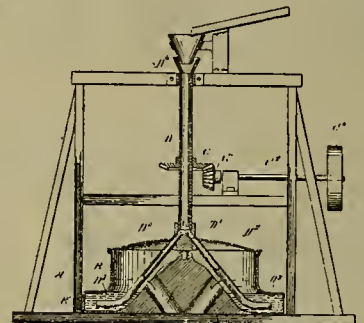
In a centrifugal mill, combination with annular bed, journal located above annular bed and concentric therewith, and means for rotating journal, of relatively long shaft flexible throughout length and formed of spiral spring, mill-roll upon the end of flexible shaft, arranged to travel over and in frictional contact with annular bed when journal is rotated and automatically leave annular bed when journal ceases to rotate.

ORE CONCENTRATOR.—No. 715,328; G. E. Woodbury, San Francisco, Cal.



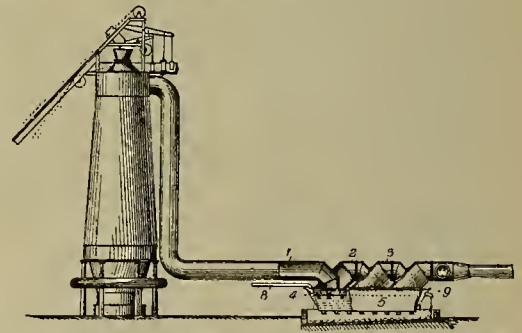
In ore concentrating table, working surface composed of grooves running longitudinally to table, standing strips dividing principal portion of grooved surface into number of sections, that portion of surface between concentrates discharging end of table and ends of standing strips having grooves of less depth than remaining portion of surface, means for imparting vibratory motion to table.

AMALGAMATOR.—No. 715,538; W. F. Bedell, Kaslo, Canada.



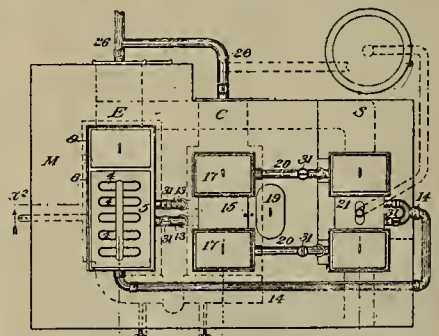
An amalgamator, comprising tank for containing mercury and having in bottom central cone provided with outlets for escape of water and sand, outlets leading from sides of cone through bottom of tank, hollow shaft stepped in cone, and hollow reaction arms extending from lower end of shaft downwardly to lower portion of tank and having lower ends extending horizontally.

BLAST FURNACE.—No. 715,519; R. C. Steese and E. L. Ford, Youngstown, Ohio.



In a blast furnace, combination of tank having overflow, series of valved openings arranged along under side of tank, series of pipes having inlet ends submerged in water contained in tank and opposite ends projecting into next adjacent pipes of series, pipe extending from blast furnace and having discharge end projecting into first pipe of series, and gutter arranged under tank and inclined, discharge tank being so arranged that material discharged into gutter from tank will be removed by overflow water.

APPARATUS FOR OBTAINING METALS BY ELECTROLYSIS.—No. 715,626; G. Taddei, Turin, Italy.



An apparatus having electrolyzing vessel or bath, heater under same, chlorinating vessel, heater under same, pipe connecting upper part of bath with lower part of chlorinating vessel, substituting vessel, pipe connecting upper part of chlorinating vessel with substituting vessel, pipe for carrying gas from last named vessel.

Mining Summary.

Specialty compiled and reported for the
MINING AND SCIENTIFIC PRESS.

ALASKA.

Hubbard, Elliot and Treat have located several veins of copper ore on Elliott creek, in the Kotsina country. On one copper glance is found which also carries silver, and others show bornite. Last year there were twenty-two claims on Elliott creek; this year has raised the total to fifty-four, all within a radius of 5 miles. The source of Elliott creek is about 18 miles from Copper river and 130 miles from Valdez.

The Aurora G. M. Co., of Kenia peninsula, is doing development work with machine drills. A mill of 100 tons daily capacity is being installed with a water power plant. B. Stevens is manager.

It is reported that the Alaska Development Co., composed of Indiana and Puget Sound men, have bonded 70,000 acres of Alaska lands to an English syndicate for a large sum, based on an agreement that the syndicate shall spend \$50,000 a year in development. The chief apparent value of these lands lies in the striking of a gusher 60 miles south of Valdez and 10 miles east of Copper river.

ARIZONA.

COCHISE COUNTY.

Superintendent E. R. West of the Easter Sunday mine, says he has seven four-horse teams hauling ore from the mine to Lowell for shipment.

The Marquette & Arizona M. Co. is incorporated by Michigan men to operate a group of claims in the Warren district near the Calumet & Arizona Co. and the South Bisbee properties.

The Miner reports forty-three claims in the Copper and Montezuma canyons, Huachuca mountains, near Bisbee, including the New York group, California and Arizona, McDowell and Gerdes group, two groups of G. Baron's, the group of A. Chedals, A. Beauchamp and Champagne's group, sold to S. Mitchell and Young, representing Michigan men. G. Baron is superintendent. Machinery will be installed and a smelter is proposed.

The new engine on the two-compartment shaft at the Bisbee West, near Bisbee, was started up last week. Manager Dwight says stringers of ore are being encountered in the shaft. Sinking will be continued till the main ore body is cut, and stations will be put in at every 100 feet.

The Modern mine, near Bisbee, in the face of the drift, 200 level, is in 160 feet. The miners broke into ore that assays 5% copper and \$15 gold. The rock carries native copper, copper glance and red oxide. Sinking has been delayed on account of water, but will be resumed as soon as pumps can be installed.

The Bisbee Miner says work on the Easter Sunday mine is suspended pending the arrival of hoisting machinery.

GILA COUNTY.

The Globe-Boston C. M. Co., developing the Mallory group near Globe, has let a contract to J. Glasston to sink the 200-foot double-compartment shaft 250 feet, from which point levels and crosscuts will be run.

The Silver Belt reports an increased flow of water in the Gray mine of the United Globe, near Globe. The water was struck in the seventh level, but is yet within the capacity of the pump.

The Silver Belt reports a heavy flow of water in the ninth level of the Old Dominion mine, the pump at the twelfth level being submerged. Three auxiliary pumps and two bailing tanks (each 800 gallons capacity) discharging a total of 2000 gallons per minute are holding the water from rising above the eleventh level. Two additional boilers and two pumps are being installed, making seven boilers to operate pumps and hoists. At the smelter two furnaces are still running, the ore coming mostly from stock piles at the mine, with the briquetting machine supplying a small portion.

MARICOPA COUNTY.

J. S. Witherlay, general manager of the Socorro G. M. Co., west of Wickenburg, says the 20-stamp mill is completed, but will not be run till the cyanide plant is finished. Fifty men are employed.

MOHAVE COUNTY.

Superintendent J. Detar has men at work on the Queen Bee mine at Mineral Park. The company has ordered a hoisting plant and as soon as it is installed sinking will begin below the 200 level. Drifts are being run south from the 180 level and north from the 125 level.

The Franconia M. Co. is preparing to work its properties in the Chemehuevi district.

Superintendent McNulty has several

men doing assessment work on his turquoise claims, near Mineral Park.

PIMA COUNTY.

The Producer group, near Quijotoa, is reported sold to the Producer M. & M. Co. for \$10,000. This group comprises nine claims in the Quijotoa district, 50 miles south of Casa Grande. There are 3000 feet of work in shafts, drifts and open cuts. A drift from the 100-foot level of the shaft on the Producer claim crosscuts a vein 11 feet in width, which carries gold, silver and copper, an average of \$15 to the ton. The camp will be known as Brownell, being named after the original promoter. A hoist and pump will be put in. F. Brownell is superintendent.

SANTA CRUZ COUNTY.

Mining is resumed on the gold prospects of the Hays Con. M., M. & L. Co., near the property of the Eureka M. Co., in the Uncle Sam district, near Nogales.

YAVAPAI COUNTY.

Parties working the Bodie mine under bond have made the first payment of the \$20,000 purchase price and have men building a wagon road to Palace Station. Val Verde has 100 men at work. The smelter runs on 5% coke.

Superintendent Monaghan, of the Home Run mine at Groom Creek, near Prescott, will put up a 10-stamp mill.

The Courier says the Poland mill, near Prescott, is in operation. Ore has been struck in the upper tunnel of the Poland Extension. Superintendent Pickrell at the President mine, has twenty men at work, and sinking from the 500-level to the 600.

The three mills on the Mudhole mine at Walker are running night and day, crushing 100 tons of ore a day.

The Val Minto M. Co. has bought the Brown ranch and water right. They have ordered 7000 feet of pipe and a 10-stamp mill. The property is in Mint valley, 12 miles northwest of Prescott.

Three furnaces are in blast at the smelter of the United Verde Copper Co. at Jerome, and others will be blown in as soon as expedient. The portions of the mine where the fire is located are bulkheaded from other workings, and carbonic acid gas, made from coke at the surface, is being blown into the mine to extinguish the fire.

CALIFORNIA.

AMADOR COUNTY.

C. D. Lane is investigating the claims owned by T. Orr, half a mile north of Plymouth. The principal outcrop is a white quartz vein, 3 feet wide, situated in the bed of Indian creek. The rock prospects well. A number of holes have been sunk on this and the adjoining property, owned by T. Boyson.

Superintendent Hampton of the Oneida mine, near Jackson, says he will sink the shaft 200 feet deeper. It is now down 2050 feet. Forty stamps are dropping in the mill.

Another strike of rich rock is reported in the Central Eureka mine, near Sutter Creek. The vein averages about \$8 per ton, but occasionally the workings discover places in the vein where a great deal of gold is visible. This is characteristic of the mines of this portion of the lode.

The shaft at the South Eureka mine, near Sutter Creek, is down 2370 feet and drifting is in progress north and south on the 2300 level. The 20-stamp mill is idle pending development of the lower level. J. Truscott is superintendent.

CALAVERAS COUNTY.

(Special Correspondence).—The Gwin Mine Dev. Co. has declared dividend No. 40 of 15 cents per share, \$15,000, payable December 16. This mine has paid during 1902, \$155,000. Total to date, \$426,500. Gwin Mine, Dec. 15.

(Special Correspondence).—Superintendent Hoffman, the Melones M. Co., is putting air pipes in the main tunnel preparatory to breaking ore on that level. Sixty stamps are dropping. The cyanide plant for treating the vanner concentrates is in operation. Melones, Dec. 16.

The Tom Smith mine on O'Neal's creek, near Sheep Ranch, is being opened by Mr. Harris. This mine is locally considered to be an extension of the Sheep Ranch vein.

Work is being pushed at the Foot & Thompson mine, near Rich Gulch. Teams are hauling pipe and machinery to the ground. It is proposed to hydraulic the surface of the vein the full length of the claim.

Near Mokelumne Hill, Superintendent C. Gall, of the Mead Ranch mine, has started a tunnel on the Mokelumne river slope of the property in the Gold Leaf claim. The tunnel will be 2300 feet long, and is expected to cut several veins that run through the Mead Ranch, as well as the Foot & Thompson and Ilex veins, at

depths of 400 to 600 feet, and will bottom the gravel channel of the Mead.

The new mill at the Fannie Marie, near Mokelumne Hill, is finished and the stamps dropping. At the Bluejay, another property of the company, work is progressing. F. Courtmarsh, of Mokelumne Hill, is manager.

EL DORADO COUNTY.

The Rio Vista G. & S. M. Co., in Fairplay district, is preparing for development work of its property, the Consummes Copper mine.

The Montezuma mine at Nashville is producing good ore. The mine is paying.

KERN COUNTY.

(Special Correspondence).—After years of waiting the people of this section are gratified to see work commence on the long proposed crosscut tunnel on the Southern Cross property near Havilah. This tunnel was begun thirty years ago, run 250 feet, and given up for lack of funds. The present operators, The Southern Cross Con. M. & T. Co., are cleaning out the old tunnel and propose to drive 3000 feet, their objective point being "Rand Hill," from which millions have been taken at shallow depths. The tunnel will have backs of about 1400 feet. In going this distance the Tunnel Co. will crosscut three large ledges at depths varying from 300 to 1500 feet. These ledges are gold bearing and from 20 to 100 feet wide. Before reaching them the tunnel will pass through a large stratum of limestone, which follows the mineralized zone on the east for miles and which appears to have a beneficial effect on the mineralization of the vein when in contact with it. Havilah, Cal., Dec. 13.

LOS ANGELES COUNTY.

The Erkenbrecher syndicate of Los Angeles has bought 4000 acres of land 12 miles west of Santa Monica and north of the Malibu ranch. The district lies a mile or more from the ocean. Oil seepages, oil sands and gas blowouts are found. The company expects to have a rig on the ground within ten days and drilling begun.

MADERA COUNTY.

The copper mines at Dalton comprising four claims owned by S. C. Olinger, have been bought by the Jesse Bell M. & M. Co. of Los Angeles, Cal. There are several shafts 40 to 60 feet deep, all showing ore. The deposits are 30 feet wide. New hoisting machinery will be put in. S. H. Baker is superintendent. These mines are peculiar in that the ore is in a state of semi-oxidation and frequently, shortly after exposure to the atmosphere, the ore absorbs oxygen so rapidly that it spontaneously ignites. The country rock in which the ore bodies are found is chiastolite schist.

MARIPOSA COUNTY.

The mines of the Mariposa Commercial & M. Co. are operating by steam, the dam on the Merced river at Bagby having been swept out by high water.

NEVADA COUNTY.

The Eureka Crown M. Co. of Minneapolis, Minn., has bought the Beckman Hill Diggings, in Pleasant valley, near Nevada City, comprising 160 acres of gravel claims, with several quartz ledges running through them. An incline will be driven to strike the channel, and then drifts run. In the spring machinery and appliances for handling the gravel will be placed on the property and the company will also develop its quartz ledges. W. W. Turney is manager.

Superintendent Foote, at the North Star mine, near Grass Valley, is building a new slime plant. The ore, after concentration, will be sized and reground in a Griffin mill and then pass over the slime plant. Some concrete work has been done and an asphaltum floor put in the mill.

A company has been formed of Utah and California capitalists to reopen the Polar Star mine of Park City, Utah; J. A. Kirby, president. The property includes 240 acres near the North Star mine.

PLUMAS COUNTY.

C. R. Thompson, superintendent of the Elizabeth mine, on Rush creek, near Quincy, says the mill has been closed down for the winter and will not resume until the tunnel is completed. The lower tunnel is in 180 feet, with 240 feet to drive to reach the main ledge, which will be tapped 200 feet deep. This ledge will be followed 750 feet to reach the shoot found in the Lewis tunnel above.

The Bulletin says C. R. Thompson, J. M. Engle and others have located on a limestone ledge from Rush creek through the mountain to the North Fork, 3 miles. The width of the deposit is 500 feet, and can be quarried.

Superintendent E. B. Kimball has six men at work at the Halsted mine on Rich gulch, near Quincy, blocking out ore. He is putting in an assaying outfit. He has, looking forward to this, located 3000

inches of the water of Indian creek at a point above Shoo Fly, and a ditch is being cut, the water to be conveyed 4 miles and used to develop electric power to be transmitted to the mine.

SAN BERNARDINO COUNTY.

The Mohave G. M. Co. are putting in air drills at the Leland mine, near Needles. They are employing forty men.

The Gold Bronze mill at Vanderbilt has been repaired and is again in operation.

SAN DIEGO COUNTY.

The Yuha oil well near Julian is down 885 feet. Last week gas was struck which raised the tools in the well 25 feet.

SANTA CLARA COUNTY.

The Orchard Oil Co., boring a well near Los Gatos, struck the third pocket of gas last week and the pressure threw the drill from the well. The well is 1300 feet deep.

Work has been resumed on the oil wells at Moody Gulch and shipments are being made.

SHASTA COUNTY.

Fifteen miners are at work on the Shasta King mine of the Trinity Copper Co., near Kennet. Development work is being done.

An undivided third interest in the Bald Eagle, Black Bear, Mabel No. 1 and Mark Master quartz claims, in Pittsburg mining district, has been sold to J. Gilardy of DeLamar.

At 2000 feet in their tunnel on the south fork of Clear creek, near Igo, the South Fork M. & D. Co. has cut the ore body. The company is composed of Boston, Mass., men. Superintendent Rogers has had twenty miners at work for a year in driving the tunnel, which, it is believed, has tapped the ore body.

SIERRA COUNTY.

Superintendent F. R. Reynolds, at the True Fissue mine, near Gold Lake, has ceased work on the tunnel for the season, but will resume in the spring.

TRINITY COUNTY.

(Special Correspondence).—The long adit tunnel, known as tunnel No. 2, at the Dorleska mine, near Trinity Center, was completed by connection with the third level of the shaft workings December 4. The distance from the mouth of the tunnel to the shaft is 1315 feet, and the connection was made 1126 feet in the tunnel and 189 feet from the shaft. Work was commenced on this tunnel Sept. 1, 1901, and has been continued uninterruptedly until completed. It is of sufficient size to admit a mule to haul cars and will be used for discharging ore and for drainage. Its average depth from the surface is 200 feet. A strong snowshed 650 feet long has been completed between the mouth of the tunnel and the mill, so that ore from the stopes can be discharged in the mill without reference to the depth of snow, which is great in this section in winter. Supplies and provisions have been got in for the season and the mine and mill will be worked throughout the winter. Upon the completion of the long tunnel work was resumed in the shaft and a fourth level will be run at a depth of 300 feet. The mill has been running steadily since last June on ore of high average value. Fifty men have been employed during the open season and twenty-five will be employed through the winter. The Union Con. G. M. Co. of Los Angeles, Cal., are owners; H. Z. Osborne, president and general manager; M. H. MacIlwaine, superintendent.

Trinity Center, Dec. 18.

The Chloride-Bailey mines produced \$13,500 during November with twenty stamps. The mine is showing improvement with development.

The Morrison & Carlock mine in Quartz valley is in pay and works forty men. The mine is down 380 feet.

Superintendent H. W. Turner has begun work again in the Cherry Hill mine, at Cherry creek, having been placed in possession by proceedings in court.

TUOLUMNE COUNTY.

A body of pay gravel is reported at the Woodside placer on Table mountain, near Columbia, in the eastern tributary which leads into the main channel. Two inclines have been made, 350 feet each, but main channel has not yet been struck. Mr. Woodside is superintendent. At present the work is being done with a horse whim.

W. Wax of Columbia has bought a one-fourth interest in the Haskell placer northwest of Columbia.

At the Enos & Bowen mine, parallel to the Densmore, northwest of Columbia, their tunnel is in 210 feet and they are breaking ore.

Superintendent K. C. Parrish started the New Era M. Co. mill, near Carters, last week, twenty stamps in all.

Superintendent J. F. Parks says 160 tons of machinery have arrived at the Kennedy mine, near Jackson, for the hoisting plant at the new shaft. The hoist will have a capacity of 1000 tons per

per day. The new shaft is down 2600 feet and the old inclined shafts on the vein are at the 2300-foot level. With the mill under construction there will be 100 stamps.

The Nixon placer M. Co. is operating the Richards ranch on Sutter creek. The company owns a mile of gravel channel along the creek. G. F. Cluff of Sutter Creek is president.

The Sonora Banner says the Jumper Gold Syndicate, Ltd., at Stent, has made application to the Superior Court to be dissolved as a corporation under the laws of this State. Jan. 16 has been set for hearing the petition.

Surveyor Donaldson and party have left Carters to survey for a lume to the Lost Fox mine, south of Carters. It will be 7 miles long. Ten stamps of the mill are running. Forty men are employed under Superintendent Engols.

The tunnel on the Lady Washington near Carters is in 200 feet. Machine drills are used.

At the Sullivan mine, south of the Black Oak, near Soulsbyville, the shaft is 200 feet deep.

The night shift has been laid off at the Cllo, near Jacksonville, the day shift being able to get out ore necessary to keep the mill going. Sinking is to be resumed after Jan. 1st.

VENTURA COUNTY.

The Sespe Canyon Oil Co. of Los Angeles, operating in the NW. 1/4 of Sec. 26, T. 5 N., R. 20 W., S. B. M., struck oil at 650 feet. The oil raised 350 feet in the well. It is 15° or 16° gravity. The well has been capped, to be opened in the spring. This is the fourth well to be struck in the Devil's Gate petroleum and brownstone district.

The Sespe brownstone quarry has closed for the winter.

The Bakersfield & Ventura Railroad Co. has 15 miles more of surveying through the Sespe canyon.

Cinnabar has been discovered near Sespe Hot Springs by Mr. McDonald.

YUBA COUNTY.

At the Government works on barrier No. 1 at Daguerre Point on the Yuha river, a double row of piling has been driven that reaches almost across the river. A quarry is being opened.

COLORADO.

BOULDER COUNTY.

(Special Correspondence).—The Wellington Oil & Gas Co. at Boulder have a contract with the Boulder Gas Works to supply crude oil for making gas. This was one of the first discoveries in the district. It has never been shot, but is pumped daily. The oil sand is 68 feet thick.

The Boulder Oil Refining & Pipe Line Co. of Boulder has organized to erect a refinery in the district. It will soon be built, the site having been selected.

The Wellington G. M. & M. Co. of Boulder, operating at Gold Hill, are preparing for development work. The main shaft with a drift 25 feet cuts the ore body at a depth of 200 feet. A crosscut tunnel, now in 250 feet, will in the next 100 feet cut the ore opened in the shaft. Ore averages \$30 per ton. The company contemplates a pyritic smelter. The mine can be operated by tunnels to a depth of 1000 feet.

The Crawford Oil Co. at Boulder have everything in readiness to start drilling well No. 2. At well No. 1 they are pumping.

Boulder, Dec. 13.

The Boulder Illuminating Oil Co. shot its well at Boulder last week, and is now pumping. The well is 2500 feet deep and was filled with oil for 1900 feet. Nitroglycerine was put in and exploded at 2000 feet and an increased flow was started.

At Rowena, on his 1000-foot contract on the tunnel on the Sancha group, F. Patterson has driven 550 feet.—The Rosalie, in Sunshine gulch, is being worked by S. Coffman, owner, and is showing sylvanite.—The White Chief Co. is having work done on its White Chief, T. P. Peale and other claims.

CLEAR CREEK COUNTY.

The Big Mediterranean and Gladstone groups in Cherokee gulch, near Idaho City, are reported sold to the Arizona M. & Dev. Co., with headquarters at Oklahoma.

Assays of ore from the west drift in the Gomez mine, near Idaho Springs, show 18-inch shoot of copper-iron sulphide on the foot wall to carry \$56.34 in gold and silver.—Superintendent B. Owen says he will install a compressor and hoisting machinery on the Teller, near Lamartine. It is the intention to resume sinking and drifting on the ore body.—A boiler and an engine have arrived for the Morning Star property. Owen & Morgan are the operators. The engine is 8x24 double cylinder, and the boiler 80 H. P.

The Memphis & Idaho G. M. Co. has bought a group of fourteen claims on Sea-

ton mountain, between the Sun and Moon and the Gem mines, near Idaho Springs. The veins will be opened at a depth of 800 feet by driving the Tropic tunnel 1000 feet ahead. The breast of the Tropic is now in 978 feet. The company has also secured the Bodices.

The Humboldt M. & T. Co. is organized to take over the Humboldt group on Ute creek, near Idaho Springs. The claims are Humboldt, Humboldt No. 2, Chicago, Emma J and Clara J. There is a 10-stamp mill on the ground which will be enlarged; F. C. Smith, manager, and K. E. Seaman, superintendent.

The Diamond Joe Reynolds mine, near Lawson, is shipping ore from the tunnel, which is in 3000 feet, with 100 feet farther to drive to connect with the ninth level.

—The Marshall-Russell M. Co. has discontinued its water power and has installed a boiler.—The Commodore M. Co. has bought a part of Red Elephant mountain and is grading for the machinery.—The Bellvue-Hudson property will resume and let a contract to sink the shaft 100 feet deeper to connect with the tunnel, which is in 1200 feet.

The upraise connecting the tunnel with the Comet shaft, near Georgetown, has broken through and ventilation is established. Manager Baldwin says developments will be made eastward.

Superintendent B. F. Kelly says that in November, in driving the Kelly tunnel, in Democrat mountain, near Georgetown, 260 feet were made through granite with twenty-six men.

CHAFFEE COUNTY.

Near Granite, the Pacific M. & M. Co.'s shaft on its Gopher claim is down 100 feet in ore. An additional 100 feet will be sunk. The vein is 9 feet wide, with 18 inches of smelting ore. A shipment of this latter showed \$59 per ton. The company has a 5-stamp mill on the property. A cyanide plant will be added. H. T. McCauley of Colorado Springs is secretary.

CUSTER COUNTY.

G. Raymond, superintendent of the Custer County G. M. Co., is putting up a hoist at the Toledo, near Florence.

EL PASO COUNTY.

(Special Correspondence).—The Colorado and Standard plants of the United States R. & S. Co., at Colorado City, are handling 800 tons of ore from the Cripple Creek district per day. The report that this company will build a large plant here is not confirmed by the management, though improvements are talked of.

The C. C. & C. C. Sampling & Ore Testing Works, J. C. Hames manager, at Colorado City, is running full capacity; have made several gold bricks, weighing 100 ounces, running 900 to 981 fine.

The Portland mill, at Colorado Springs, has been running irregularly the past month owing to lack of oil.

Colorado City, Dec. 12.

FREMONT COUNTY.

The well of the Fraser Oil & Gas Co., at Florence, is pumping 100 barrels per day. A new oil field close to Canyon City is to be prospected. J. L. Cooper of Canyon City has secured an option on the B. F. McCumber farm, 4 miles east of that place, and will prospect for oil.

The tunnel being driven on the Combination of the Florence M., M. & S. Co., at Florence, which is intended to cut the Summit and Nebraska claims, is in 200 feet.

The tunnel being driven by Hendershot & Nelson on the Lucille, near Florence, to tap the Victoria vein, is in 200 feet. At the 120-foot point a vein of ore was cut which gave returns of 420 ounces silver and some copper.

At the Wisconsin, Barry & Burnett have driven a tunnel 200 feet and have opened a body of lead and zinc ore.

GILPIN COUNTY.

H. C. Bolsinger is sinking on the True Democracy lode in Nevada district, and at a depth of 200 feet cut lead ore 6 inches wide. He is driving the 120-foot level.

Superintendent W. Richards of the Nevada Con. M. Co. has resumed operations at its King and Lamberson & Warren properties in the Nevada district, near Central City. In the upper levels of the King stoping has begun. The shaft will be sunk down 400 feet deeper. At the Lamberson drifting and stoping is in progress. President T. Marks of Denver says the company intends to erect a concentrating plant in the spring.

Manhire Bros., lessees on the Kemp-Calhoun mine, at the head of Leavenworth gulch, near Central City, have the shaft down 300 feet, showing 3-foot vein, with 10 to 12 inches smelting ore.

GRAND COUNTY.

(Special Correspondence).—The Bennett claims on the north fork of Grand river, near Lulu, has two tunnels, 165 feet and 125 feet. Some good values have been found, in silver and lead. The vein is 20 to

60 feet in width; runs from \$10 to \$25 per ton. In early days ore was shipped 75 miles by wagon to rail, but values were insufficient.

The Rollstone mine in Baker gulch will tunnel to cut the Grand Lake vein 500 feet deep. Tunnel will be 500 feet long. In an old tunnel several veins were cut with values from three to 400 ounces silver.

Lulu, Dec. 12.

GUNNISON COUNTY.

The main shaft on the Whig mine in Jones gulch, near Gunnison, is down 240 feet. The Pitkin Gold Belt M. Co., operating the property, is shipping ore running \$100 in gold. Near the Whig, in the same belt, the Williams lode, operated by W. Scott of Pitkin, is showing ore.

It is reported the Revenue group of nine claims in Box Canyon district, between Ohio City and Wapinita Hot Springs, will resume. A road to the mine is being built. The shaft is showing 7 feet of shipping ore and sinking will be continued.

The Old Lot mine at Spencer is shipping ore. The Davenport & Adair tunnel at Duhois is showing large veins of low-grade ore. The Headlight M. Co. is sinking the Poorman and Headlight shafts in Spencer district. Both shafts are down 100 feet. At Vulcan the Good Hope mine sends two cars of twenty tons each weekly to the smelters of ore running \$300 in gold. The shaft on the Good Hope is down 500 feet.

HINSDALE COUNTY.

A strike is reported in the Bonhomme mine, in Burrows park, near Lake City, owned and operated by the Scantic G. M. Co. of St. Louis, Mo. The vein has been cut at 1620 feet from the mouth of the tunnel and has been crosscut 50 feet.

JEFFERSON COUNTY.

It is reported that the smelter at Golden will be closed on account of trouble in getting lime rock. The company owns quarries north of town, but had roads have made it impossible to get enough lime to the smelter to keep it going. Manager Carpenter intends building a railroad 4 miles in length to the quarries.

LAKE COUNTY.

W. A. Miles, of Cleveland, Ohio, has bought the G. & C. S. Co. plant at Leadville. Mr. Miles expects to treat 500 tons daily. Two years ago this smelter, which is a pyritic plant, was closed and has been in possession of the United States marshal. Recently the stockholders held a meeting and ratified a proposition for a sale.

It is reported that Mr. Miles will organize a new company and expend \$250,000 in putting the plant in shape.

MESA COUNTY.

At the Debeque oil fields drilling on the first well of the Stateline Oil Co. has been resumed. The well was 100 feet deep; and will be continued at the rate of 100 feet a day. G. W. Bartholomew is in charge of the Stateline Co.'s work and that of three other companies owning 30,000 acres of land contiguous to the Debeque fields.

PARK COUNTY.

The Red Cross M. Co., J. A. Shinn of Leadville manager, has mining property in Buckskin gulch, near Alma, and is doing development work. Shinn says the formation of the country's lime and quartzite, with the porphyry on top; the ore is found under the lime, resting on quartzite. From the different holes the average assays run \$25. The ore is lead and zinc carrying gold and silver.

It is reported from Tarryall that several new locations have been made and other properties reopened along Tarryall gulch. The Silver Heels T. Co., operating on Mount Silver Heels, have opened pay ore, and so has the Oregon M. & S. Co., at the head of the gulch. This company is planning to put up a mill in the spring.—The Wolverine M. & M. Co., operating on Mineral Ranch hill, have found pay ore in their tunnel.

SAGUACHE COUNTY.

On Cechetopa creek, near Cechetopa, the Colorado M. Con. Co. is pushing work on the Standard and Sterling lodes. A 200-foot shaft is being sunk on the vein in the 1000-foot tunnel.

SAN JUAN COUNTY.

The Kendrick & Gelder Smelting Co. is driving development with electric drills on the Henrietta, Prospect hasin, near Silverton. In the breast of No. 7 level, over 400 feet below the other deepest workings of the mine, there are 5 feet of smelting ore. The ore bodies in Nos. 1, 2 and 3 levels, higher up, with a large tonnage of ore opened, are held in reserve awaiting the connection with No. 7 level, which is in 1700 feet.

SUMMIT COUNTY.

T. Brown, working the Sallie Barber on Mount Baldy, has closed the property for the winter. He says he has opened up a

21-foot vein with a paystreak 18 inches wide. The ore averages in values, gold and silver \$15, iron 20% and a little lead.

Clydo & Etzler at the June Bug on Gibson hill are sinking a winze back 50 feet from the breast of the tunnel where the ore shoot is located.

The Juventa of the Augusta M. Co. has closed down indefinitely.

The Gold Cord M. & S. Co. proposes to work its New Lexington group. The contractors driving the Gold Cord tunnel at Kokomo expect to cut the Champen vein soon. At the West Dove Nest mine ore was cut at 100 feet in the shaft and a contract for drifting let.

TELLER COUNTY.

(Special Correspondence).—The El Paso Con. G. M. Co. of Colorado Springs, operating on the west slope of Beacon hill, Cripple Creek district, has completed a new plant of machinery at a cost of \$100,000, and have completed a new shaft from the bottom of the mine 600 feet to the surface, it being the largest in the district. The shaft is 5x7 feet in the clear, three compartments. The hoisting engines are duplicates of those at Stratton's Independence. The old shaft was too far south. The production of the property has been twenty-five tons or less per day, from which the new equipment and the purchase price of adjoining territory (\$50,000) and running expenses of the mine has been paid the past nine months. Beginning with December the output will be doubled. The property is virgin from the 600-foot level to the surface. The most of the network of veins which traverse this property, which have been opened at the lowest level, have had little ore taken from them.

The Elkhorn, Mary McKinney and El Paso mines in Cripple Creek district have agreed to start a drainage tunnel which will be about 4000 feet long to the El Paso mine, cutting over 255 feet below the Standard tunnel. It is expected to complete it in twelve to eighteen months.

Cripple Creek, Dec. 13.

T. Johnson et al., stockholders of the Theresa G. M. Co., have filed suit against J. T. Milliken et al. and the Theresa G. M. Co., asking that the four years' lease recently granted to Secretary L. E. Hill of the Golden Cycle Co. be annulled; that an injunction be issued restraining him from work on the property, and that defendants pay the indebtedness on the Theresa property, amounting to \$40,000. Plaintiff also asks for an accounting on all ore taken by defendants from the Theresa ground. In the complaint it is alleged that, after ascertaining that the rich veins on the Golden Cycle Co.'s ground extended into Theresa ground, the officers of the Golden Cycle Co. bought a control from A. E. Colburn, former president of the Theresa Co., October 1, 1902, and after securing the resignation of the officers of the Theresa Co., elected themselves and have ever since been operating the Theresa claim for their own gain. The complaint also states that under the Hill lease stockholders are paid a totally inadequate royalty of 15%, and that the officers, in violation with the agreement of A. E. Colburn, have repeatedly refused to pay the Theresa Co.'s debts and have borrowed \$50,000.

Development on Ironclad hill, Cripple Creek, the last few months, has demonstrated that the cyanide process can successfully treat thousands of tons of the oxidized ore there, and arrangements are being made to go into the business on a large scale. Stratton's Cripple Creek M. & D. Co. has thousands of tons, says Manager Rice, that can be treated at a profit by cyanide, and as soon as legal complications can be adjusted, leaching tanks will be scattered over their property to handle the dumps that average from \$5 to \$10 per ton.

On the Burns claim of the Acacia Co. on Bull hill, Baker and associates are working on the south end. They have put in machinery and will sink 150 feet before drifting. A vein carrying good values was cut at 80 feet.

The Dexter shipped a carload of ore last week which averaged \$30.

The Valley M. Co., leasing on the Shortloft No. 2 on Bull hill, is averaging fifteen tons per day, averaging \$90. The rock is broken on the 700 and 800-foot levels.

The damaged stacks at the Isabella, Cripple Creek, have been replaced and work resumed.

J. Nesbit is putting up a cyanide plant at Altman. He has leases on the dumps of the Pharmacist, Zenobia and Burns properties, within a short distance of the mill. The rock will be first treated as it comes from the mine without crushing, and Mr. Nesbit claims he will get 80% of the values. After this, the rock will be crushed and another 15% extracted. The time of treatment is twenty-four hours at most. Nesbit claims that he will be able to treat \$5 ore at a profit.

J. H. Hadley, of the Sioux City M. & D. Co. is considering a cyanide mill for the

Fort Wilcox property, next to the Fluorine of the Montreal Co. The Fluorine vein runs into the Fort Wilcox, but has never been worked. Lately the Sioux City L. Co., which also works the Fluorine claim, has been taking ore from the two properties, and has a shipment at the Eagle sampler which will go \$300 to the ton. The lessees will build a cyanide plant to handle the low grade oxidized ores.

It is reported from Cripple Creek that on the 1000-foot level of the Bluebird a 2-foot vein of dark fluorspar has been cut which shows free gold.

McInnis et al., leasing the north end of the Maud Helena of the Pilgrim Co., have found a vein which gives values of \$20. They have a shaft started.

Returns have been received on a 14-ton shipment sent by Gilmore & Searles, operating block G of the Morning Glory No. 2, of the Work M. & M. Co., Cripple Creek, which ran three ounces gold. The shipment consisted of sorted rock and slime from the washers, the average values from this lease being 1½ ounce. These lessees are operating from the Gilmore shaft. It is reported that Whetstone & Reed, leasing another block of this claim, have opened ore 3 feet in width near the line between the Morning Glory No. 2 and the Jackpot. The ore is believed to be an extension of the Jackpot vein. There are ten sets of lessees working upon blocks of this company's territory.

The Times, at Cripple Creek, says J. H. Rudd and M. Hawkins have taken a two years' lease on the Janet W. claim of the Republic Co. on Beacon hill. A royalty of 20% is required after deducting freight and smelter charges. The depth to which lessees may mine is 450 feet. The territory of the Janet W. from 450 feet down was previously leased to the El Paso Co.—S. McDonald, manager of the Strong and Gold King Co.'s, has a two years' lease on the Clara D. of the Lexington Co. on a royalty of 25%. This is the same ground from which Lessee Kirk last year took \$70,000.

Manager Hamlin of the Granite mine, near Cripple Creek, has started the tenth level south to prospect that end of the property. There are two dikes crossing the south end and it is intended to run out these workings to intersect them. These dikes have yielded ore at their intersection with the veins in adjoining properties.

Manager Keener says the crosscut being driven at the 500 level on the Eclipse Con. on the northwest slope of Battle mountain, near Victor, has cut the dike 100 feet. The ore carries from \$2 to \$9.—Danzell & Wilson, leasing on block 11 of the Victor, are making shipments. Lessees working on the War Eagle are shipping forty tons a day and have cleaned up \$25,000.

The Record says all the samplers of the district at Cripple Creek are crowded with ore, mining companies and lessees trying to make a record the last month of the year. At the Rio Grande, Eagle and Cripple Creek samplers two shifts are employed crushing 1500 tons daily.

Raid and associates, leasing the south end of the Burns, owned by the Acacia Co., are drifting on a shoot of ore, assays running as high as \$40. A trial shipment was sent out this week.

Manager Hanley of the Enterprise G. M. Co., at Cripple Creek, reports a strike in the shaft. Mr. Hanley recently let a contract to sink 100 feet. Last week they broke into a 4-foot vein that dipped into the shaft at 130 feet depth. Assays give \$3 to \$8 per ton.

The Gold sampler, at Goldfield, has been leased by Rice & Temple, who will convert it into a cyanide mill. The mill will have a capacity of fifty tons a day, to be increased later to 100 tons.

A strike has been made on the north end of the Zenobia, on Bull hill, owned by the Stratton Cripple Creek M. & Dev. Co. A short time since the directors had decided to close the mine, but Manager Rice requested two days' grace, within which time he crosscut from the 500 level into a vein east of the shaft from which 6 inches averages \$300. The entire breast is pay, the lowest assay being \$20.

Returns from two cars of ore sent from the Abe Lincoln, in Poverty gulch, owned by the Stratton estate, returned \$69.80 a ton.

The Practical Leasing Co., operating the Trachyte on Bull hill, Cripple Creek district, have found the vein 400 feet from the surface.

Miners in the employ of the Tillery lease on the El Paso, Cripple Creek district, are laying track in the Old Gold tunnel to workings in the El Paso, 4000 feet, where the extension of the C. K. & N. vein has been cut.

S. A. Hughes of Florence, W. McMillan of Colorado Springs and C. R. Peck of Salida have taken a five-year bond and lease on a group of four claims belonging to Davidson & Warwick. The property is in King's gulch, south of Salida, at the

head of the Sangre de Cristo range, and includes a millsite. The principal values are gold, silver, lead and copper.

Lessee O. P. Finn, on the Magna Charta ground on Ironclad hill, Cripple Creek, has put in two cyanide tanks, ten tons daily capacity each.—Franklin, Sifton & Co. of Colorado Springs, lessees on the Grace Greenwood, are building ore bins and a blacksmith shop and have started sinking a shaft.—M. J. McCormack is putting up machinery on the Annie on Gold hill.

During the month of November 5592 men were employed in the Cripple Creek district, the payroll amounting to \$569,001.91.

A strike is reported from the Golconda mine on the southeast slope of Squaw mountain, near Cripple Creek, in the old shaft on the south end of the claim, where 4 feet of ore, which runs \$45, has been found at a depth of 160 feet. Two million dollars has been spent on this property within five years without making a paying mine. It is owned by E. Ridgway of Philadelphia. It is in the granite. A new shaft house is to be erected at the new strike.

The sinking of the main shaft at the Ajax at Cripple Creek has been resumed. The shaft is 900 feet deep and will be put down to the 1000-foot level.

IDAHO.

IDAHO COUNTY.

P. Clark, it is reported, has given up his \$250,000 bond on the Jumbo mine in Buffalo Hump district. The owners will develop the property. They claim that a sixty days' run with a 2-stamp mill output \$62,000, with ore ranging from \$10 to \$24 per ton.

A 5-stamp mill for the Galena Creek Co. has been built near Elk City. The mill is run by water power. "In the spring," says J. D. Boyer, manager, "an electric plant will be put in to supply all the mills in the section with power. Our company will then add fifteen stamps."

The Snowhose Co., of which Mr. Boyer is manager, has set aside \$40,000 to open the claims. A contract for a tunnel will be let, and if developments warrant, twenty stamps will be put in.

SHOSHONE COUNTY.

Ore was found last week in the lower tunnel at the Reindeer, near Mullan, at 325 feet from the mouth. The mineral occurs in a ledge 3 feet wide composed of talc, spar, quartz and chalcophyrite. It is thought to be an offshoot from the main ledge. The company will drive ahead to the point under works where pay ore was found several months ago. Good headway is being made.

The Enterprise M. Co. are developing the Merrill claim east of the Hunter, near Mullan. In cleaning out an old tunnel they discovered the ledge. The people who drove the tunnel cut through the ledge without giving it attention, and not finding anything after drifting in the quartzite, abandoned it.

The Morning mine, at Mullan, has resumed operations with a full crew. The recent cold snap had caused a scarcity of water, which caused a shut down of the concentrator and mine. Four hundred men are employed.

T. F. Kelley of Chicago has bought for \$14,000 a three-sixteenths interest in the Yolande property, three claims and millsite, adjoining the Hunter mine at Mullan.

The station and hoist at the Hunter mine, at Mullan, were burned last week and the mine and mill have closed down. The company will rebuild. The fire started from a candle sticking in the timber near the engine. While the station man was landing a car the candle dropped out of the stick and ignited some oily cotton waste.

WASHINGTON COUNTY.

C. F. Macey, manager the Iron Springs M. Co., operating on Paradise Flat in Black Lake district, near Weiser, says a plant will be built in the spring. Experiments are in progress as to the best plan of reducing the ores.

The Signal says the Gold Coin M. Co. and the Rankin General M. Co. are keeping the road to Black Lake open. They have four 12-horse teams on the road from the railroad to the mines taking in supplies and machinery. The Gold Coin Co. will start their cyanide plant January 1st. The capacity of the plant, originally fifty tons per day, has been increased.

MICHIGAN.

HOUGHTON COUNTY.

The Calumet & Hecla Co. has in operation the filters through which all the waters used in the steam plant will pass. The capacity is 500,000 gallons per twenty-four hours.

On account of ice on Portage lake, boat shipments of copper have ended for the season and rail shipments begun. One of

the heads at the Atlantic mill started up last week on Winona rock, stamping 360 tons daily. It is reported that 15,000 tons will constitute the mill test.

The Calumet & Hecla has started up the smelters, which were closed during the coal strike, re-employing fifty men who were laid off.

MARQUETTE COUNTY.

A fire is reported in Section 16 mine at Ishpeming, a property of the Oliver M. Co. All the shafts have been sealed in an effort to smother the flames. It is thought no lives were lost. The mine employs 300 men.

MINNESOTA.

SAINT LOUIS COUNTY.

The Minnesota Iron Co. has let contracts for 1,200,000 yards of stripping. Of this, 700,000 yards—part from the Day mine at Hibbing and the rest at the Bent mine—has been secured by the Drake & Stratton Co.

MISSOURI.

JASPER COUNTY.

Zinc miners of the district about Joplin are arranging to export a large tonnage of ore to Europe with a view to raising the price of spelter.

MONTANA.

BROADWATER COUNTY.

Two carloads of ore were shipped last week to East Helena from the Quartette mine on Weazel gulch.

GALLATIN COUNTY.

Corundum is being shipped from the mill of the Montana Corundum Co., working the deposits near Bozeman.

MADISON COUNTY.

The Sentinel reports a strike in the Eagle, near Pony. The vein cut is 10 feet wide and assays \$25.

C. H. Hand, general manager the Watseca M. Co., operating the Watseca mine in the Rochester district, reports a strike in the Alameda vein, south of the 450-foot level. The ore is base, but they will concentrate and ship it. They have also opened a new shoot north of the shaft. This gives the company three veins of pay ore, and one about which little is known, as it has not been prospected enough to show its value. There are two shafts on the Watseca, one of which is 550 feet deep and on the pitch of the vein, and the other vertical 450 feet. Next month the latter will be sunk to the 600 mark. A mill is being built. A strike has also been made on the Longfellow claim, half a mile southwest of the Watseca. The shoot was cut at a depth of 300 feet. The property is owned by J. A. Murray and S. Lisa, of Butte, but worked by E. W. Merritt under a lease and bond. At the Elgin mine, owned by Butte men, sinking has been resumed and will go to the 450-level.

MEAGHER COUNTY.

A strike of 16 inches of copper glance is reported at Copper. J. Blewett, who formerly operated at Copper, has again taken charge.

MISSOULA COUNTY.

The construction of the smelter at Saltese has been started.

PARK COUNTY.

The Enterprise says D. L. Wing of Chicago has bought the Winslow & Burns placer workings in Emigrant gulch, near Livingston, making a total of thirty claims controlled by his company. All of these claims adjoin, giving 337 acres along Emigrant creek and cover both sides of the creek. It controls water right of 10,000 inches. Three steam shovels will be used, each weighing seventy tons, with a dipping capacity of 2½ cubic yards. The gravel will first be put over an 11-inch screen and this will leave 75% of clean gravel for the sluice boxes. There will be two sluices, each 600 feet long by 10 feet in width, one sluice being used while the other is being cleaned. Mr. Wing has named the property the Sallie B.

From Helena is reported the consolidation of the Bear Gulch mines in Park county, as the Kimberley-Montana G. M. Co. The new company acquires the mines and mill of the Gold King Co., the Revenue Co. and the Bush Estate. With the completion of the mill the company will have 100 stamps.

SILVER BOW COUNTY.

The crosscut at the 800 level of the Emma mine in Butte has cut the vein 325 feet from the shaft.

NEVADA.

ELKO COUNTY.

A 3-foot vein of free gold ore is reported in the Eclipse mine at Tuscarora.

The locators and operators interested in the oil fields of Elko county have formed the Elko Oil Association, and elected the following officers: President, E. S. Farlington; vice-president, W. Willis; sec-

retary, G. W. Bruce; treasurer, J. Herderson. T. Hunter, J. A. McBride and A. W. Hesson are members of executive committee.

ESMERALDA COUNTY.

The Vulcan C. M. Co. has paid off the attachment of \$2000 placed against it by N. A. Dunyon, and has resumed with ten men at work.

HUMBOLDT COUNTY.

The mill at Mill City is running on ore from the Arizona mine at Dun Glen. The Sheba Co. is to build a mill at Star City.

It is reported from Antelope valley that C. Hayes, of Bridgeport, has made a strike on a claim in Antelope, joining the Golden Gate.

LINCOLN COUNTY.

A new 10-stamp mill for the Quartette Co. is to be built by the Risdon Iron Works, of San Francisco, Cal. The mill will have cement mortar blocks, 1000-pound stamps and a complete modern equipment. A Fairbanks-Morse gas engine will furnish power. The millsite is being graded and it is expected to have the mill completed by March 1, 1903. In the Quartette mine a station has been cut at the 600 level.

Five prospect shafts are being sunk on the McGee group in Silver King, the new mining district. The gold values run from \$15 to \$150 per ton.

NYE COUNTY.

(Special Correspondence)—The most important event of the week at Tonopah is the strike in the Montana-Tonopah, lying north of the Mizpah. It has been a question in Tonopah whether the Mizpah ore shoot extended north of the Tonopah Co.'s holdings, but this find proves that it does.

W. Oshorn, formerly with the Electro-Geodetic Surveying Co., is building a mill 4 miles north of Tonopah, at Butler's wells, to treat the low-grade ores of the camp—several thousand tons of which are on the dumps, lessers having shipped the high-grade ores. This is the most important step taken thus far for the larger development of the district.

Tonopah-Gold Mountain, 4 miles south of Tonopah, continues to attract the attention of prospectors and mining men, on account of surface showings.

The Colehan shaft on the Tonopah-Union is down 80 feet on a vein 14 feet wide, carrying values ranging from \$20 to \$200 gold. The values occur in crystallized quartz. The formation is porphyry and rhyolite.

Tonopah, Dec 18.

Following the recently reported strike on the 400-foot level of the Mizpah at Tonopah, the next day the ledge was cut on the 500 level and a rich vein exposed.

Thursday of last week, an 8-foot vein was cut in the Colehan-Gold Mountain property that went \$30 in gold, and on the Fraction an ore body was found in shaft No. 5, 400 feet west of the old strike. The rock is full of wire silver.

Friday, in the south drift of the 300 level of the Mizpah, the Valley View ledge was cut, 11 feet wide of shipping ore.

It is reported that a vein had been cut in the Montana-Tonopah.

The Ohio-Tonopah is down 400 feet; the Montana, 390 feet; the North Star, 480; New York-Tonopah, 500; Tonopah City, 380; Gold Hill, 380; Mizpah, 500, and Wandering Boy, 500.

At the Belle of Tonopah property, adjoining Montana-Tonopah on the north and King-Tonopah on the west, the shaft is down 100 feet, with the bottom in porphyry showing stringers of quartz. A hoist will be set up. F. K. Thorn is superintendent.

At the Fraction, near Butler, the north and south drifts from the 400-foot level, shaft No. 2, are in 175 feet. The crosscut from shaft No. 1 is in 275 feet, and connection with the north drift from shaft No. 2 will soon be made. Another shipment of ore was made this week.

Since placing machinery in position the Little Tonopah D. Co. have sunk 55 feet, and sinking 4 feet a day. Two shifts are employed. The bottom of the shaft is now in mineralized limestone.

F. B. Work, superintendent of the New-house properties at Hanapah, says a drift has been started from the 80-foot level and is now in 10 feet.

The shaft at the Ohio-Tonopah is down 380 feet and has passed through the volcanic ash and mud and is in a hard formation of rhyolite.

The Tonopah-Silver Top M. Co., whose property is 2000 feet northwest of the Mizpah in Oddle mountain, have a shaft down 60 feet. Manager T. Fleming says he will put in a steam hoist, sink deeper and crosscut.

The Butler M. Co., owning nine claims near the Little Tonopah D. Co., a mile and a half northwest of Butler, has incorporated under the laws of Arizona.

Manager F. Thorn, the Tonopah Union M. Co., on Gold mountain, reports an 8-

foot ledge of \$20 gold ore in the main shaft at a depth of 80 feet.

The Kennelworth-Tonopah G. M. Co. is incorporated; J. H. Wright, president; W. J. Taylor, F. E. Meek, W. O. Mumford, L. H. Conley, J. Straub. The company owns ten claims and a tunnel site, 18 miles northeast of Tonopah. Preliminary work has been done on all the properties. J. Straub is superintendent.

W. Osborn will put up a quartz mill for custom ores, at Butler's wells, 4 miles from Butler; capacity, five tons daily.

It is reported that Hannapah, 18 miles east of Butler, will be included in the survey being made of the Tonopah district by the United States Geological Survey.

The tunnel of the Mizpah mine, in Tonopah, has broken into the Lynch and O'Meara workings at a depth of 250 feet.

STOREY COUNTY.

Work at drill hole No. 3 on the Brunswick lode at Virginia City has been temporarily suspended, the hole having caved. The hole will be reamed and cased.

At the Con. Cal. & Va. last week thirty-three cars, assaying \$49.34 gold, were taken out, and 215 cars assaying \$20.61.

WASHOE COUNTY.

Work is resumed at the Brighton mine near Washoe City. The Harris mine has resumed and ore is being taken out.

Governor Sparks has sixty men in his mines and mill in Wedekind district.

WHITE PINE COUNTY.

The contractors will drift 500 feet on the 700 level of the Starr mine, near Cherry creek.

NEW MEXICO.

GRANT COUNTY.

The sale of the Comanche group of thirty-eight claims and the Klondike mine in the Burro mountains, near Silver City, to the Comanche M. & S. Co. of Milwaukee, Wis., has been closed. S. S. Curry of Ironwood, Mich., is president.

GUADALOUPE COUNTY.

The O. K. crude oil well in the Santa Rosa oil field is down 900 feet. The Con. Oil Co.'s well is down 936 feet, at which point the drill broke, causing a delay of two weeks.

It is reported that C. H. Taggart of the Pintada M. & C. Co. struck a small flow of oil while drilling for water at the property of the company.

LINCOLN COUNTY.

At Nogal, the American M. Co. has installed pumps to handle the flow of water expected to be tapped when the ore body is cut at the 500-foot level.

RIO ARRIABA COUNTY.

It is reported that Cleveland, Ohio, men have bought the mica-bearing veins near the Mexican plaza at Petaca.

OREGON.

BAKER COUNTY.

(Special Correspondence).—The Wellington G. M. & M. Co. at Huntington have sent a plant of hydraulic machinery to Baker City to work placer ground owned by them. Average value per cubic yard is reported to be 60 cents, with a deposit 20 thick. They expect to handle 1000 yards per day. On the same ground a 3-foot vein of sulphide ore running \$57 has been found.

Baker City, Dec. 14.

At the Columbia mine, near Sumpter, a 200 H. P. electric plant is being installed for operating the mill and hoist.

The plant at the California is nearly finished.

The shaft on the Golden Wizard is down 140 feet. A large pump has been bought. The new hoisting plant will go 1000 feet. A mill is also talked of by the management.

Preparations are being made to start the 40-stamp mill at the Bonanza. It has been closed since sinking began in the main shaft last summer; 400 feet has been sunk since; 200 feet more will reach the 1000-foot mark. A large body of ore has been opened up.

The cyanide plant at the Cougar has made a test run.

JACKSON COUNTY.

A cyanide plant is being built at the Dewey mine, near Gazelle.

JOSEPHINE COUNTY.

The Baby quartz mine, in Jump-Off-Joe district, near Grant's Pass, has been bonded to C. C. Higgins of Salt Lake City, Utah.

N. E. Smith, owning the St. Helena placer mines at Waldo, says the parties having a bond on the property have stopped work for the winter because of snow and a slide, which carried away part of the ditch. The gravel is hydraulicked, the water being brought in 5½ miles by ditch and flume.

The 10-stamp mill at the White Swan mine is running on ore from the third level. A station pump is being set up on the third level.

SOUTH DAKOTA.

LAWRENCE COUNTY.

At Deadwood the Imperial G. M. Co. is reported to be planning the enlargement of its cyanide plant. New finishing rolls and tanks are to be added and the capacity of the mill increased from 125 tons to 250 tons per day. The building originally designed for a roaster will be used for a leaching room.

A new ore shoot has been found by the University G. M. Co. in the South Dakota ground on Annie creek, south of Deadwood. Most of the ore is oxidized and assays \$24, the rest carrying \$32. The latter is a smelting ore and will be shipped.

The Columbus Con. at Lead has opened up new ore bodies at the northern end of its territory on Blacktail gulch. The find was made while continuing old workings bought by the Columbus last summer, and is parallel to the other ore bodies that the company has been working.

Since their discovery in 1876 the Black Hills mines have produced \$121,000,000 in gold and silver, largely the former, and by far the larger portion from this county.

A test of 300 tons of tin ore from Bear Gulch district is to be made at Deadwood.

PENNINGTON COUNTY.

The Gold Standard Dev. Co. has bought several mining claims near Pactola. The veins exposed on the property show a free-milling ore running \$6 per ton in gold. G. Philipps is superintendent.

TEXAS.

HARDIN COUNTY.

C. G. Parsons, of Bryan, reports having sold two and one-half acres of his Sour Lake oil land to G. E. Hart, of Beaumont, for \$2000 an acre, making twenty and one-half acres Parsons has sold to the same party.

JEFFERSON COUNTY.

The National Refining Co., of Beaumont, has bought five acres of land 3 miles south of the city, on the Port Arthur Railroad line, and will put up a refining plant that will turn out 100 barrels daily of refined product from the Beaumont crude oil.

UTAH.

BEAVER COUNTY.

It is reported the Imperial Copper M. Co. has bought the Comet and Massachusetts groups near Frisco. The Comet adjoins the Cactus and Massachusetts in Lober gulch. The Imperial tunnel, being driven through Massachusetts territory, is in 900 feet.

The Vicksburg G. & C. M. Co., at Milford, reports a vein of carbonate ore in the shaft.

Superintendent W. A. Wilson, the Sheep Rock mine, near Beaver, has let a contract to sink the shaft 160 feet to the 300 level, where a crosscut will be run to the vein.

J. H. Dupaux, part owner in the Amelia M. Co.'s property, near Beaver, has taken a two years' lease and bond on the interests of the other shareholders. The company's ground consists of four claims ½ mile east of the Burning Moscow.

Salt Lake men have an option on the Washington group, in Labor gulch, west of Frisco, for \$50,000. They have started to sink a shaft. The Washington, near the Massachusetts, has a steam hoist.

JUAB COUNTY.

The West Tintic Iron King Con. M. & M. Co. has incorporated. L. Ludvigson, C. Christensen, J. R. Sallsbury, H. D. Goldsbrough and D. F. Dowd. The company will operate six mining claims in the West Tintic district.

The Miner says the third furnace of the United States smelter, at Eureka, was blown in last week. The capacity of the plant is 500 tons of ore daily.

For eight carloads of ore, containing 232 tons, the Lower Mammoth Co. received \$4338 net from the smelter. The consignment was sold on controls showing fifty-four ounces silver, 2% copper and 85 cents gold.

Manager Allen of the Centennial Eureka reports the tramway at the Tintic property is handling twenty tons an hour.

SUMMIT COUNTY.

Superintendent J. S. Foe of the Park City G. & S. M. Co., reports pay ore at a depth of 55 feet in the shaft on Success ground, being a shoot of lead carbonates, which returns 9% lead and 24.3 ounces silver.

The Record says the Bogan and Silver King Extension properties, near Park City, have been incorporated as the Silver King Con. M. Co. of Wyoming. W. W. Bradley, H. Cohen, A. F. Harrison, H. L. Miller and J. C. Hamm. J. H. Keetley is superintendent.

The new Park City sampler is in operation.

Manager A. H. Mayne has the new hoist at the Minola in operation. A com-

pressor is to be installed. The shaft is down 200 feet.

TOOELE COUNTY.

Assays of samples from the face of the drift in the Clifton Belt M. Co.'s property at Deep creek have been received by Manager Wilson in Salt Lake City, showing the ore to carry 16.2% copper, \$4.20 gold and 5.4 ounces silver.

Superintendent Raddatz says connection between the two headings of the Honerine tunnel at Stockton has been made, which makes the tunnel 2800 feet long. In addition to driving, an air shaft was sunk 280 feet to the plane of the tunnel from which to begin another heading. The tunnel will open up the ore bodies of the Honerine and other mines that will be drained by it.

J. Brewer and S. C. Dallas are at work on the Accident group in Dutch mountain, Clifton district, near Gold Hill. They have 150 feet of work done and expect to make 100 feet more before closing for the year. The rock is a copper-silver ore.

A. and T. Sunderland have resumed work on the Commerce and Midland lodes, adjacent to the Footman. There is 119 feet of tunnel and a 40-foot shaft.

UTAH COUNTY.

A strike is reported in the Thistle mine, near Spanish Fork, last week in the drift running north on the 100-foot level. The assay shows 126 ounces silver and \$4 gold. They have cut the same ore body at the bottom of the shaft.

WASHINGTON.

FERRY COUNTY.

J. F. Lansing of the San Poil Lumber Co. has bonded for \$24,000 the Blue Horse group of five claims on Iron mountain, near Republic. The vein has been opened by a 50-foot shaft, with a 30-foot drift from the bottom.

W. F. Bassett reports that in a drift from the Growler mine, on Copper mountain, from the end of the tunnel the vein is 4 feet wide, carrying ore which runs \$19 in silver and \$3 in gold.

OKANOGAN COUNTY.

Superintendent E. P. Gaillac of the Beaver Lake M. Co., near Chasaw, reports having crosscut at 300 feet in the tunnel a body of copper ore, and as soon as there is sufficient snow for sleighing will begin shipping to the Boundary smelters.

The Opal M. Co., of Columbus, Ohio, last week bought the Ben Harrison group of four claims, near Chasaw. W. C. Peay is manager.

M. M. Walsh, general manager for the Monterey M. Co., reports that men in the big tunnel at the Buckhorn have been laid off on account of bad air pending the placing of a new air plant. The tunnel is in over 1000 feet.

The Chesaw Improvement Co. has begun work on a group of claims near town and is finding good ore.

The tunnel on the Six Eagles is in 850 feet, with three shifts at work. The ground is hard and dry. Several stringers have been cut. C. F. Hagerty is foreman.

SNOMOMISH COUNTY.

The Copper Bell, near Index, reports a strike of chalcopryite.

WYOMING.

ALBANY COUNTY.

Hoisting machinery is being put in at the Emma G. mine in the Cooper Hill district, north of Laramie. The shaft is down 135 feet and it is proposed to sink to the 200 level and crosscut to the vein.

CARBON COUNTY.

It is reported that coal from the Bemls and Oesterberg mine, 22 miles northwest of Saratoga, is of coking quality, and in this form will be used in the smelter at Grand Encampment and at the New Rambler.

The Tribune reports the New York & Utah drill at Price has penetrated oil sand and that oil is coming into the hole.

It is reported the North American Copper Co., near Encampment, has bought the Osceola and Olive D., adjoining the southerly line of the Rudefeha properties, for \$200,000. The dip of the vein on the Rudefeha is southerly and on an incline that would carry it into the Osceola and Olive D. grounds. The North American owns the Rudefeha.

FOREIGN.

BRITISH COLUMBIA.

The Wilcox mill and the aerial tramway are in operation at Ymir.

At Minneapolis, Minn., is incorporated the Lardeau-Duncan Development Co. of British Columbia, to develop the Primrose and Golden Circle properties in the Lardeau-Duncan district.

The development on the Oyster-Criterion group, in the Lardeau district, aggregates over 900 feet, and a 10-stamp mill has been bought. A compressor

plant is contemplated by Manager Pool. Motive power will be derived from Pool creek.

The Ethel mine, near Trout lake, is preparing to ship, having ready twenty tons of first-class and 200 tons of second-class. The first-class will average 300 ounces, the second-class will run from \$25 to \$30 per ton.

It is reported that E. J. Edwards has taken a lease and bond on the Bluejay in Skylark camp, near Phoenix, and will work the mine this winter.

Of ten tons of ore treated at Hail Mines smelter, from the Hampton, near the Arlington, Siocan, the first grade yielded 1983 ounces of silver and the second grade 566 ounces. The lead is 100 feet wide, with paystreak on the hanging wall.

The Bosun, near Sandon, has seven ore sorters separating zinc for shipment to Iola, Kans. Seventy tons were shipped this week.

The production of ore in Rossland camp for the first eleven months of 1902 was nearly 40,000 tons greater than for 1901.

The War Eagle and Center Star mines at Rossland are making concentration experiments with a view to improving methods and increasing output.

At Camp McKinney the Cariboo-McKinney M. & M. Co.'s mine and mill are working. On the Waterloo ten men were at work, with J. Harvey in charge. In the face of the drift, 150 level, there are 4 feet of gold quartz.

At Fairview the new Fairview Co. is completing the cyanide plant. No mining or milling in progress on the Stenwinder pending the completion of the cyanide plant. At Hedley City the Nickel Plate stamp mill is being built. The masonry foundations for the mill and the flume are in course of construction. The tramway from mine to mill is being built. Part of the way will be a gravity line and the remainder electric.

About 200 tons of ore were shipped from the Silver King mine, near Nelson, last week for treatment at the Hail mines smelter.

It is reported the East Crow's Nest C. & C. Co. of Spokane, Wash., has bought 540 acres of coal land near Alberta for \$70,000.

The Iron Mask, near Kamloops, reports having crosscut its ore body 75 feet wide that runs 6% in copper.

Smelter returns from the last car of ore shipped to Trail from the Providence mine, Greenwood, weight 33,152 pounds net, gave gross proceeds after smelter deductions of \$2442.09. There are seventeen men employed at the mine, drifting and sinking the shaft.

An incline will be sunk 400 feet on the Dewey, 6 miles south of Kamloops. The property is owned by J. G. McMillan of Roche Harbor and H. L. Dickson.

CHINA.

H. Capler, of Gridley, Cal., has returned from the province of Mongolia, North China, to secure men to go with him to the gold fields of Mongolia. He has also secured a dredger. The lands, known as the Ion property, include 10,000 acres, part of which is adapted to dredging and hydraulicking. J. T. McCall, of San Francisco, Cal., spent two years in prospecting the Ion property.

MEXICO.

GUANAJUATO.

Mining conditions in Guanajuato will be improved upon the completion of the power plant of the Guanajuato Power Co. One thousand men are employed in building dams, reservoirs and canals, etc. This will soon be completed, when the work of putting the transmission line to the Guanajuato mining district will be begun. The company expects to be able to deliver power in Guanajuato by July 1. President Hine says the transmission line will be 110 miles long, carried upon steel towers. Each of these will be 46 feet in height, carry three lines of transmission. There will be twelve such towers to the mile. There will be 1320 towers. The transmission line will carry 800 H. P. delivered at Guanajuato. To generate this the waters of a stream have been diverted and conveyed through a 5-mile canal and delivered to Pelton wheels under a head of 328 feet. The officers of the company are: H. Hine, president and general manager; J. H. Hammond, vice-president; L. E. Curtis, vice-president and treasurer; I. W. Bonbright, secretary, and E. R. Coffin, assistant secretary and treasurer.

LOWER CALIFORNIA.

In the Viznaga mine, in Alamo district, 75 miles from Ensenada, a 7-foot ledge is reported, rich in gold. H. M. Russell, the principal owner, has sent a brick weighing \$3555 to Los Angeles, Cal. This amount is reported to have been taken from 600 pounds of ore. The company has a 5-stamp mill in the district. The best mine of the company has been the Aurora, which has been worked continuously fifteen years.

Personal.

G. C. HEWITT, Colorado Springs, Colo., is in Mexico.

J. S. SEMONES has returned to Denver from Silverton, Colo.

J. A. SHINN has returned to Leadville, Colo., from Denver, Colo.

T. SHELTON of Leadville, Colo., has returned there from Denver.

W. H. HILL has gone from The Needles, Cal., to Milford, Utah.

P. COLLINS is assayer at the Portland mill, Colorado Springs, Colo.

D. V. DONALDSON, Colorado Springs, Colo., is in Philadelphia, Pa.

H. A. VON HEMERT, Colorado Springs, Colo., is in Los Angeles, Cal.

F. ROYER of Denver, Colo., has returned there from Old Mexico.

T. S. FARRIS has returned to Cripple Creek, Colo., from Grand county, Colo.

A. W. BOYD is superintendent of the American Eagle mine in Elk City, Idaho.

F. F. THOMAS, manager Gwin mine, Calaveras county, Cal., is in San Francisco, Cal.

G. M. MACNEILL, general manager U. S. R. & S. Co., Colorado Springs, Colo., is in Europe.

W. C. RALSTON, manager Melones M. Co., Melones, Calaveras county, Cal., has gone East.

H. A. COHEN of Salt Lake, Utah, has resigned his connection with the DeLamar properties.

B. MATTISON has accepted a position as foreman Trade Dollar mines, at Silver City, Idaho.

G. W. BARTHOLOMEW of Debeque, Colo., is inspecting copper mines in western Arizona.

W. L. WATTS of Los Angeles, Cal., is examining mines near Carters, Tuolumne county, Cal.

E. C. VOORHIES, superintendent Lincoln mine, Sutter Creek, Cal., is in San Francisco, Cal.

D. MCCLURE, superintendent Gwin mine, Calaveras county, Cal., is in San Francisco, Cal.

JOHN GRAY of Prescott, Ariz., is superintendent Poland Extension mines, Poland, Yavapai county, Ariz.

SUPERINTENDENT MOYNAHAN of the Home Run mine, Groom Creek, Ariz., has returned from the East.

W. C. HUNTER, assayer at the Standard Con. M. Co., Bodie, Cal., has returned from San Francisco, Cal.

J. L. MERY, draughtsman and engineer for the United Verde C. Co., Jerome, Ariz., is in San Francisco, Cal.

J. C. JENS of the Iowa Con. M. Co. at Rich Gulch, Calaveras county, Cal., has returned from New York City.

P. HOOK, superintendent the Democracy mine at La Cananea, Sonora, Mex., has returned from Bisbee, Ariz.

P. E. MURRAY, superintendent of the Zubieta mines in Sonora, Mexico, has returned from San Francisco, Cal.

A. B. CALL of New York, who has been making mine examinations in the State of Nevada, is in San Francisco, Cal.

SUPERINTENDENT CARMICHEL of the Confidence mine, Confidence, Cal., has returned to the mine from Nevada.

J. H. BAKER of El Paso, Texas, is now superintendent of mill for Columbia M. & M. Co., Bacarra, Sonora, Mexico.

A. BUCKBEE of the Virtue mine, Baker county, Or., has gone to Montreal, Canada, to consult with his company.

F. R. CULBERTSON of San Francisco, Cal., manager Chloride-Bailey mines, Trinity county, Cal., is at the mines.

C. M. DABNEY of San Francisco, Cal., has gone to Butler, Nev., to look after his mining interests in Tonopah district.

LEON M. HALL of San Francisco, Cal., has returned from the Con. California & Virginia mines at Virginia City, Nev.

F. BROWNELL, superintendent of the Producer M. & M. Co., Quijota, Pima county, Ariz., is in San Francisco, Cal.

G. W. HORN, superintendent the Horn mine, near Defender, Amador county, Cal., has returned from San Francisco.

T. FLEMING, secretary and manager the Tonopah-Silver Top M. Co., Butler, Nev., has gone East on company business.

SUPERINTENDENT W. C. WYNCOOP of the Liberty group, Butler, Nye county, Nev., has returned from Philadelphia, Pa.

L. H. CARVER, E. E., C. E., of San Francisco, Cal., has returned home from an inspection of mines in Butte county, Cal.

W. C. GREEN, for the past five years with The Mine & Smelter Supply Co. of Denver, Colo., has accepted a position as western representative of Revere Rubber

Co., Boston, Mass., with headquarters in Denver.

GENERAL MANAGER M. B. KERR of the Jumper Syndicate properties at Stent, Cal., has returned from San Francisco, Cal.

H. L. JOHNSON, superintendent of the Oriental mine Allegheny, Sierra county, Cal., is in San Francisco on a business trip.

W. STANLEY of Denver, Colo., has been in Vanderbilt district, Cal., looking after the mining interests of the A. G. Campbell estate.

K. F. HOFFMAN of San Francisco, Cal., is superintendent Melones M. Co., Melones, Calaveras county, Cal., vice F. Langford, resigned.

D. McFALL, superintendent of the Home mine, near Nevada City, Cal., has returned from a business trip to San Francisco, Cal.

SUPERINTENDENT G. L. HUTCHINS of the Carbonate mine, Frisco, Utah, has taken charge of the Copper King mine in Star district, Utah.

F. FUNK, formerly foreman at the Morning mine, Mullan, Idaho, is now acting in a similar capacity at the Helena-Frisco mine at Gem, Idaho.

N. E. SMITH of the St. Helena G. M. Co., Waldo, Or., is in San Francisco, Cal., and goes next week to Arizona to look after mining interests there.

J. S. PALMERLEE, electric engineer the Copper Queen M. Co. at Bisbee, Ariz., has resigned and will manage mining properties in which he is interested.

JOHN ROSS, JR., superintendent Wildman Syndicate, Sutter Creek, Cal., is at the Chloride-Bailey mine, Trinity county, Cal., on professional business.

G. R. ADAMS of the Oquirrh-Bingham properties, Bingham, Utah, has been succeeded as superintendent by H. A. Brown. Mr. Adams has gone to South Africa.

At a meeting of the claim owners of the Tintic district, Utah, held at Silver City on the 13th inst., W. D. Wilson was elected mining recorder for the ensuing term of two years.

G. DOUGLASS, C. E., and R. E. PALMER, E. M., of the Rio Tinto mines of Spain have been investigating mining and metallurgical methods in the Lake Superior copper region.

E. R. WOAKES of Nelson, B. C., who has been visiting the mother lode at Sutter Creek, Cal., the guest of E. C. Voorhies, superintendent of the Lincoln mine, has returned home.

SUPERINTENDENT CHASE of the Liberty Bell properties, Telluride, Colo., has returned from Denver, Colo., and Manager Winslow of the Liberty Bell is at Telluride from Kansas City, Mo.

EDWIN REYNOLDS, long general superintendent E. P. Allis Co., and chief engineer Allis-Chalmers Co., is now consulting engineer. I. H. Reynolds, his nephew, succeeds him as chief engineer.

Commercial Paragraphs.

THE Paraffine Paint Co. of San Francisco, Cal., have bought thirty-four lots near the S. P. Co.'s track, West Berkeley, Cal., for an increased plant to double the output of P. & B. paint.

R. MCF. DOBLE, of San Francisco, Cal., is planning a 150-mile transmission line on steel towers for the Guanajuato P. & E. Co., Guanajuato, Mexico, the towers to be 440 feet apart, the line voltage to be 60,000.

At the regular meeting of the New England Railroad Club at the Pierce Hall, Boston, on December 9, a paper on "Electrically Driven Shops" was presented by R. L. Warner, Boston sales manager of the Westinghouse Electric & Manufacturing Co. Mr. Warner's paper was illustrated by a large selection of stereopticon views, showing many examples of the application of direct current and induction motors to the driving of machine shops, tools and other apparatus.

In the issue of the 6th inst. appeared a notice of the purchase of the stock, business and good will of the firm of John Taylor & Co. of San Francisco, Cal., by F. W. Braun & Co. of Los Angeles, Cal. In connection therewith, under recent date, F. W. Braun & Co. write: "We take pleasure in advising that we have purchased the stock, business and good will of John Taylor & Co., the well-known dealers in assayers' materials, laboratory, mine and mill supplies, 63 to 67 First street, San Francisco, Cal. We shall continue the business in San Francisco, aiming to add largely to the stock and facilities, so as to insure quick and satisfactory dispatch of all orders and business entrusted to us. Geo. B. Crooks, who for so many years was associated with John Taylor & Co., continues with us, as will also most of the employees of the retiring

firm. Wm. Roslington, for several years connected with our firm, assumes the management of the San Francisco house. We hope to be accorded the same liberal favors that our predecessors enjoyed, and will endeavor by careful attention to orders, and correct business methods, to merit confidence, good will and kind preference on orders. In taking over the business of John Taylor & Co. we will make no change in our Los Angeles house, which will be continued as heretofore, and we hope the enlarged field of operations opened up to us in conducting both houses will so increase our output of goods as to make our purchasing power and facilities for business such as will make ours the leading house in the line in the United States, if not in the world."

Catalogues Received.

"Wire Rope Tramways" is the title of the latest catalogue of the Trenton Iron Co., Trenton, N. J. It is a revised reissue of former publications on the subject of wire rope trams. It is profusely illustrated, showing the successful operation of the Bleichert tramway in places where transportation would be impossible without the aid of an aerial tramway. It calls particular attention to two new devices—the patent locked-coil track cable and the Webber compression grip, with automatic attacher. This little volume, which will be sent to those desiring it upon application, appeals to those who have difficult problems in transportation to overcome.

Catalogue No. 4, "Steam Engines and Boilers," issued by Harron, Rickard & McCone, 21-23 Fremont street, San Francisco, Cal., is worthy the attention of those interested in the subject. There are 164 pages, finely produced, of sizes, specifications, description and illustrations, with details of structure, dimensions, and other practical data. A convenient correspondence code is appended.

Universal dry concentrator, quartz crushers, screening machinery, crushing rolls and drying machinery are the subjects of catalogues received from the Krom Machine Works, 170 Broadway, N. Y.

Obituary.

GEORGE CUMMING, a prominent Pacific Coast inventor and engineer, died at his home in San Francisco, Cal., on the 14th inst., aged 78. In 1852 he was chief engineer of the Pacific mail steamship Panama. When the Risdon Iron Works of San Francisco was founded he was made its foreman, and in succeeding years had much to do in a mechanical way with the mining industry of California. Among other devices, he invented and put in general use a portable steam stamp mill and a portable miner's forge.

On the 12th inst., George W. Prescott, for several years president Union Iron Works, San Francisco, Cal., died at his residence in San Francisco, Cal., aged 69. In 1863 he bought the Donahue Iron Works of San Francisco, in 1875 the firm was changed to Prescott, Scott & Co., and in 1883 incorporated as the Union Iron Works. Mr. Prescott was its first president, resigning in 1890.

G. S. MORE, at one time superintendent of the Confidence mine, Tuolumne county, Cal., and more recently on the office staff of the Utica mine at Angels, Calaveras county, Cal., died December 11 at Angels, Cal., at the age of 39.

Books Received.

"Ancient and Modern Engineering and the Isthmian Canal," is the title of a handsome volume by William H. Burr, C. E., 8vo, XV+473 pages, profusely illustrated, including many halftones. It is a book of great interest to engineers in all branches of their profession and of absorbing interest to the non-technical reader. It deals with great engineering enterprises, bridges, steel buildings, railroad work, etc. Particularly apropos is the portion devoted to the competing routes for an isthmian canal in Central America, of which it contains complete engineering data. \$3.50 net, postage 27 cents additional. John Wiley & Sons, New York, N. Y.

Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

CONVEYING APPARATUS—No. 715,471. Dec. 9, 1902. F. A. French, San Francisco, Cal. This invention relates to improvements in transportation systems whereby it is desired to convey by means of suspended cables a burden in either a longitudinal, transverse or vertical direction in rela-

tion to a certain surface area. It consists of suspended cables, a burden carrier adapted to be supported upon and to be moved by said cables, independent fall lines whereby the burden may be deposited or taken up at any point, means for supporting said fall lines, and means for operating lines and cables. There is also an automatic discharge device between the fall rope and the load whereby the load is discharged by the movements of the rope.

CAN SEALING DEVICE.—No. 715,397. Dec. 9, 1902. A. W. Livingston, Alameda, Cal. This device is designed for the hermetical sealing of containing cans without the use of solder. It comprises a can head or cover consisting of a central body, a peripheral flange and permanently attached flexible cemented coated filament, said filament having a fibrous body of sufficient thickness to render the same capable of being compressed and flattened transversely to form a relatively wide flat packing when the seam is closed thereon.

New Patents.

DEWEY, STRONG & CO.'S SCIENTIFIC PRESS PATENT AGENCY, 330 Market St., S. F., has official reports of the following U. S. patents issued to Pacific coast inventors:

FOR THE WEEK ENDING DECEMBER 9, 1902.

715,234—OIL BURNER—G. W. Arper, Oakland, Cal.
715,534—DISPENSING LIQUORS—S. H. Atchison, S. F.
715,535—VINE CUTTER—J. M. Barnes, Fresno, Cal.
715,635—HARNESS—Beideman & Cameron, Union, Wash.
715,634—SPLIT PULLEY—J. W. Berry, Tacoma, Wash.
715,548—BURNER—H. B. Cary, Los Angeles, Cal.
715,549—OIL BURNER—H. B. Cary, Los Angeles, Cal.
715,550—TRY SQUARE—H. B. Cary, Los Angeles, Cal.
715,553—OIL BURNER—H. B. Cary, Los Angeles, Cal.
715,731—WINDOW LOCK—"I." Chope, S. F.
715,471—CONVEYING APPARATUS—F. R. French, S. F.
715,375—DOOR HANGER—J. Handschmacker, S. F.
715,480—MOTOR—J. G. Hudspeth, Berkeley, Cal.
715,397—CAN SEALING DEVICE—A. W. Livingston, Alameda, Cal.
715,414—ROPE TRAMWAY—"A. Painter, S. F.
715,419—INK ERASER, ETC.—H. Pease, Portland, Or.
715,289—GATES—G. W. Peck, Greenville, Cal.
715,599—SHOELACE—E. L. Pitts, Jerome, Ariz.
715,294—WINDOW SHADE—M. E. Reilly, Everett, Wash.
715,318—RAKE—W. S. Richards, Albany, Or.
715,918—STEAM BOILER—Thomas & Stetson, S. F.
715,320—PLOW—I. L. Umstead, Camarillo, Cal.
715,441—FLUID PUMP—W. C. Vandergrift, S. F.
715,324—CAN TESTING MACHINE—Wachhorst & Ross, S. F.
715,326—PLANNER CHUCK—S. E. Walling, New Whetcom, Wash.
715,725—ROPE DRIER—D. Wieting, Meridian, Or.
715,725—ROTARY ENGINE—F. E. Womer, Fairhaven, Wash.
715,328—CONCENTRATOR—G. E. Woodbury, S. F.
715,730—THEATER APPLIANCE—A. M. Zinn, Spokane, Wash.

Latest Market Reports.

SAN FRANCISCO, Dec. 19, 1902.

METALS.

SILVER.—Per oz., Troy: London, 22½d (standard ounce, 925 fine); New York, bar silver, 48½c, refined (1000 fine); San Francisco, 48½c; Mexican dollars, 37½ @ 38½c San Francisco, 38½c New York.

Silver shows a slight upward tendency. It is probable, however, that no material advance in price can be anticipated until silver is utilized more extensively in manufactures and arts.

COPPER.—New York: Standard, \$10.75; Lake, 1 to 3 casks, \$11.65; carload lots, \$11.30; Electrolytic, 1 to 3 casks, \$11.45; carload lots, \$11.25; Casting, 1 to 3 casks, \$11.35; carload lots, \$11.10. San Francisco: \$14.00. Mill copper plates, \$17.00; bars, 18 @ 24c. London: £50 11s 3d spot per ton.

The copper situation is practically unchanged. There has been a slight upward tendency during December, probably due to concerted effort on the part of sellers to secure the best possible price on contracts for the first quarter of 1903.

LEAD.—New York, \$4.12½; Salt Lake City, \$3.50; St. Louis, \$4.00; San Francisco \$4.50, carload lots; 4½c 1000 to 4000 lbs.; pipe 5½, sheet 6, bar 5½c; pig, \$4.75. London: £10 16s 3d per ton.

SPELTER.—New York, \$4.90; St. Louis, \$4.50; London, £19 17s 6d per ton; San Francisco, ton lots, 6½c; 100-lb lots, 7c.

ANTIMONY.—New York, Cookson's, 9½c; Hallett's, 8½c; San Francisco, 1000-lb. lots, 10c; 300 to 500 lbs., 11c; 100-lb. lots, 13 @ 15c.

TIN.—New York, pig, \$25.75 @ 25.87½; San Francisco, ton lots, 27c; 500 lbs., 27c; 200 lbs., 27½c; less, 28c; bar tin, \$3.32c. London, £116 7s 6d spot.

PLATINUM.—San Francisco, crude, \$18.00 @ 19 oz.; New York, ingot, \$19.00 per Troy oz. Platinum ware, 75 @ 80c per gram.

QUICKSILVER.—New York, \$45.00 @ 46.00; large lots; London, £8 15s; San Francisco, local, \$46.00 @ 47c; 70½ lbs.; Denver, \$49.50. Export, \$43.50.

BABBITT METAL.—San Francisco, No. 1, 10c; No. 2, 7c; No. 3, 6½c; extra, 17½c; genuine, 35c; Eclipse, 37½c.

ALUMINUM.—New York, No. 1, 99½ pure ingots, 35c; No. 2, 90½, 30c to 34c.

SOLDER.—Half-and-half, 100-lb. lots,

18c; San Francisco, Plumbers', 100-lb. lots, 15.10c.

NICKEL.—New York, 50@60c $\frac{1}{2}$ lb.; ton lots, 45@48c.

STRUCTURAL MATERIALS.

IRON.—Pittsburg, Bessemer pig, \$24.25; gray forge, \$21.15; San Francisco, bar, 3c $\frac{1}{2}$ lb., 3c in small quantities.

STEEL.—Bessemer billets, Pittsburg, \$28.00@30.00; open hearth billets, \$32@34.00; San Francisco, bar, 7c to 12c per lb.

CEMENT.—Germania, \$2.50@2.75; K. & B. S., \$3.00; Hewmoor, \$2.90; Trowell, \$2.90; Portland, \$2.50@2.75 per bbl.

LIME.—Santa Cruz, \$2.25; Roche Harbor, \$2.25 per bbl.

LUMBER.—(Retail): Pine, ordinary sizes, \$20.00@22.00; extra sizes higher; redwood, \$22.00@23.00; lath, 4 feet, \$1.25@1.50; pickets, \$1.95; singles, \$2.35 for No. 1 and \$2.00 for No. 2; shakes, \$13.50 for split and \$14.50 for sawed; rustic, \$26.00@32.00.

NAILES.—Per keg (list prices): No. 20d to 60d, Wire, \$3.30; Cut, \$3.30; 10d to 16d, Wire, \$3.35; Cut, \$3.35; 8d, Wire, \$3.40; Cut, \$3.40; 6d and 7d, Wire, \$3.50; Cut, \$3.50; 4d and 5d, Wire, \$3.60; Cut, \$3.60; 3d, Wire, \$3.75; Cut, \$3.75; 2d, Wire, \$4.00; Cut, \$4.00. Special rates for car-load lots.

GENERAL SUPPLIES.

POWDER.—F. O. B. San Francisco: No. 1, 70% nitro-glycerine, per lb., in carload lots, 15c; less than one ton, 17c. No. 1*, 60%, carload lots, 13c; less than one ton, 15c. No. 1** 50%, carload lots, 11c; less than one ton, 13c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2*, 35%, carload lots, 9c; less than one ton, 11c. No. 2** 30% carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 725 kegs, \$1.50 per keg; less car lots, \$2 per keg.

CAPS.—3x, \$5.50 per 1000; 4x, \$6.50; 5x, \$8; Lion, 9x, in lots not less than 1000.

FUSE.—Triple tape, \$3.60 per 1000 feet; double tape, \$3.00; single tape, \$2.65; Hemp, \$2.10; Cement No. 2, \$3.00; Cement No. 1, \$2.65, in lots of 3000 feet and up.

CANDLES.—Granite 6s, 16 oz., 40s., 10c $\frac{1}{2}$ set; 14 oz., 40s., 9c.

CHEMICALS.—Cyanide of potassium, 98%-99%, jobbing, 25@26c $\frac{1}{2}$ lb.; carloads, 24@24c; in 10-lb. tins, 35c; sulphuric acid, in carboys, 66% B, 2c $\frac{1}{2}$ lb.; soda ash, \$2.00 $\frac{1}{2}$ lb.; hyposulphite of soda, 24@30c $\frac{1}{2}$ lb.; blue vitriol, 54@64c $\frac{1}{2}$ lb.; borax, concentrated, 7@8c $\frac{1}{2}$ lb.; chlorate of potash, 12@13c; roll sulphur, 3c; alum, \$2.00@2.25; flour sulphur, French, 34@35c; California refined, 2@2c; nitric acid, in carboys, 8c $\frac{1}{2}$ lb.; caustic soda, in drums, 3@4c $\frac{1}{2}$ lb.; Cal. s. soda, bbls., \$1.25@1.50 $\frac{1}{2}$ lb.; sds., \$1.05; chloride of lime, spot, \$2.50@2.60; nitrate of potash, in bbls., 8c; caustic potash, 10c in 40-lb. tins; sulphide of iron, 9c $\frac{1}{2}$ lb.

OILS.—Linsed, boiled, bbl., 54c; cs., 59c; raw, bbl., 52c; cs., 57c; lots of 5 bbls., 1c less; Lucol oil, boiled, bbl., 48c; cs., 53c; raw, bbl., 46c; cs., 51c. Kerosene —Pearl, per gal., 22c; Astral, 22c; Star, 22c; Extra Star, 24c; Eocene, 23c; Elaine, 23c; Water White, in bulk, 16c; Mineral Seal, iron bbls., 18c; wooden bbls., 20c; cs., 24c; Mineral Sperm, cs., 26c; Deodorized Stove Gasoline, bulk, 17c; do., cs., 23c; 86° Gasoline, bulk, 21c; do., cs., 27c; 63° Naphtha or Benzine, deodorized, in bulk, per gal., 16c; do., in cs., 22c; Lard Oil, No. 1 bbl., 95c; cs., \$1.00; Neats-foot Oil, bbl., 70c; cs., 75c; No. 1 bbl., 56@57c; cs., 57@60c; Sperm, crude, 50@60c; Natural White, 65c; Bleached do., 70c; Whale Oil, cs., 50@55c.

RED LEAD AND LITHARGE.—One ton and over at one purchase, per lb., 6c; 500 lbs. and less than 1 ton, per lb., 6c; less than 500 lbs., 7c.

ASSAY LITHARGE.—Per lb., 8c.

BISMUTH.—Subnitrate, per lb., \$1.60.

BONE ASH.—4c $\frac{1}{2}$ lb.

BORAX.—Crystal, 7c; calcined, 25c.

CHROMIUM.—(90% and over) per lb., \$1.25.

COPPER.—Carbonate, 20c; Red oxide, $\frac{1}{2}$ lb., 60c.

MANGANESE.—(90% and over) $\frac{1}{2}$ lb., \$1.25.

MERCURY.—Bichloride, $\frac{1}{2}$ lb., 90c.

MOLYBDENUM.—25c $\frac{1}{2}$ gramme; 1000 grammes—24c $\frac{1}{2}$ lb.

PHOSPHORUS.—(American) $\frac{1}{2}$ lb., 80c.

SILVER.—Chloride, $\frac{1}{2}$ oz., 75c; nitrate, 55c.

SODIUM.—Metal, $\frac{1}{2}$ lb., \$1.00.

URANIUM.—Oxide, $\frac{1}{2}$ lb., \$3.50.

ZINC.—Metallic, chemically pure, $\frac{1}{2}$ lb., 50c.

ZINC.—Dust, $\frac{1}{2}$ lb., 10c.

ZINC.—Sulphate, $\frac{1}{2}$ lb., .04c.

(These prices are wholesale, f. o. b. San Francisco, unless otherwise noted.)

SITUATIONS WANTED.

Wanted, position as assayer or assistant, Jan. 1st. References. Address Box 18, this office.

Cyanide Chemist wants position. Amalgamator and assayer. Graduate School of Mines. First-class references. Address "Cyanide," this office.

Superintendent, competent assayer, chemist and surveyor, experienced in development work, wishes position in any capacity. "Seattle," this office.

Cyanids man and assayer wants position. Can take shift on mill if needed. Practical experience and reliable. C. F., Mining and Scientific Press.

Engineer wants position to run boiler or mill engine or pump. Use to combustion of oil and Corliss engines. Have recommended. Good mechanic. R. Blackwell, Elsinore, Riverside Co., Cal.

All around mechanic, 15 years' experience stationary and locomotive engineer, 5 years foreman of construction and boiler work, wishes mechanical position, or engineer on gold dredger. Address C. E. H., this office.

A sober, industrious young man desires a situation as surveyor, assayer, draughtsman and bookkeeper. Has had three years' technical training and three years' practical experience in gold and quicksilver. Am conversant with the estimation of ores and the preparation of maps and reports. Best of references as to ability and character. Address "M," care of Mining and Scientific Press.

A energetic young man, thoroughly conversant with the indications, occurrence, mining and reduction of quicksilver ore, wishes a situation as superintendent of a quicksilver property. Technically trained. Can handle men to advantage and am thoroughly acquainted with the duties of the office. All references as to character and ability. Address "Quicksilver," care of this office.

Engineer at present in field will be open for engagement Feb. 1st. Will engage with substantial people by the year as manager, superintendent or owner, or, if field is open, for lessor position, subject to advance upon results obtained. Thorough in technique and practice. Successful with men. Credentials the best. Address E. D. B., this office.

Competent and reliable technically educated man, 34 years of age, desires position with a good mining company. Has had wide experience in the handling of low-grade gold ores where economy was essential to success. Can give best of references. Address L. D. H., care Mining and Scientific Press.

Mining Engineer with twelve years' practical experience in mines and mills wants position as superintendent. School of Mines graduate. Has had extensive experience in developing prospects into shape for actual working on a large scale. Also practical cyanide manager, assayer and surveyor. Address "Engineer," this office.

Competent Millman, Machinist and Chemist. Experience free mill and concentrating. College education. Have built and operated mills in Montana for 12 years. Competent accountant and able to administer affairs of a company. Would like situation with a company out of a promoter's hands. References the best. Address H., care this office.

Wanted, position as manager or superintendent of mining property, or would accept a position as consulting engineer. Have had over thirty years' experience and can refer to some of the best known people, both on this coast and in the East. Salary not so much an object as permanent employment. Address "Mine Superintendent," care of Mining and Scientific Press, 330 Market St., San Francisco, Cal.

ENGINES, BOILERS, PUMPS, Etc.

The UNITED RAILROADS offers for sale, in good order, the following machinery:

- 2 sets of Cross Compound Condensing Engines, Scott & O'Neill cut-off, of 750 H. P. each; cylinders 39 in.—41x60 in. stroke, with direct acting air pump and condenser, Union Iron Works, builders. This firm built the U. S. warship "Oregon."
- 2 Circulating Pumps for condensing plant, Thompson & Evans, builders.
- Elephant Typo Boilers, 60 in. x 16 ft., 150 H. P. each, set independent, Union Iron Works, builders.
- Boiler Food Pumps, Thompson & Evans, builders.
- Deep Well Pump, Thompson & Evans, builders.
- Douglas Reversible Link Engine, about 15 H. P.

ALSO,

- 2 sets of Engines built by the Risdon Iron & Locomotive Works, each set consisting of a triple expansion jet condensing engine 15x24x38 in., of 550 I. H. P., high and intermediate pressure cylinders being tandem, of the Reynolds & Corliss types, and the low pressure being a cross with Myers cut-off, each set having an independent air pump division steam end 12x16 in. with Risdon Iron Works condenser.
- 2 Stirling Boilers, 250 H. P. each, drums 2 ft. 10 in. x 11 ft., and 244 tubes.
- 2 Risdon Condensers.
- 1 Circulating Engine.
- 2 Risdon Air Pumps 9x15 in.
- 1 Davidson Fire Pump 5x7x10 in.
- 2 Davidson Food Pumps No. 5.
- 1 Dow Duplex Pump 5x8 in.
- 1 Centrifugal Pump.

APPLY:

UNITED RAILROADS,

Purchasing Agent,

49 Second St., Room 86,

San Francisco, Cal.

MACHINERY FOR SALE.

FOR SALE.

- 1,000,000 ft. of standard black wrought iron pipes, second hand, in good condition, sizes $\frac{1}{2}$ to 12 in.
- 500,000 ft. of flanged wrought iron casing, size 2 to 6 in.
- 225,000 ft. of flanged threaded iron casing, size 2 to 34 in.
- 10,000 ft. of 6-in. riveted steel pipes.

ENGINES.

- One 30x60 right hand Fraser & Chalmers Corliss engine with flywheel 18 ft. dia. x 44 in. face, complete, in first-class order, ready for immediate delivery.
- Ws also have with this engine a triple leather driving belt 160 ft. (sandlee.)
- One 16x38 left hand Corliss engine with flywheel 11 ft. dia. x 30 in. face, complete and in first-class order.
- One 24x48 Wabeslook Corliss engine
- One 20x32 Wabstor, Camp & Lams double cylinder double drum hoist.

BOILERS.

- One 250 and one 450 H. P. Hazleton tripod boilers.
- Two 104 H. P. Abscondroth & Root boilers.
- Two 165 H. P. Abscondroth & Root boilers.
- Four 250 H. P. Campbell & Zell water tube boilers.
- Four 125 H. P. Babcock & Wilcox water tube boilers.
- One 75 H. P. Hsine water tube boiler.

AIR COMPRESSOR.

- One 20x24x24 National Drill & Compressor Co. air compressor.

The above items do not represent all of the machinery we have in stock. In addition, we offer you all kinds of automatic, compound and slide valve engines, ranging in sizes from 3 to 250 H. P.

Horizontal tubular boilers ranging from 10 to 150 H. P.

Vertical boilers, both submerged and full length tubes, from 5 to 100 H. P.

First-hand boilers from 15 to 100 H. P.

One Silsby first pump; besides we have single, duplex and compound pumps of every size.

100,000 ft. of first hose from the Pan-American Exposition.

Hoisting rope of all sizes.

Shafting, pulleys, belting and a full line of mill supplies.

Four turbines water wheels from 25 to 80 H. P.

Ask for Our Complete Catalogue No. 360.

CHICAGO HOUSE WRECKING CO.

West 35th and Iron Streets,

CHICAGO, ILL.

SECOND-HAND

Dynamos, Motors, and Electrical Appliances.

All Money Savers.

Repair Anything.

Have You a Dynamo or Motor For Sale?

GUARANTEE ELECTRIC COMPANY, 8 W. Cor. Adams and Clinton Sts., Chicago

FOR SALE--A BARGAIN.

3 Practically New Five-Foot Huntington Mills with Extras. All in AI Condition.

Also, 1 New Four-Foot Frue Vanner.

Absolutely New. Perfect Condition.

Address FRICOT & MILLER,

Latrobe, El Dorado Co., Cal.

Corliss Hoists.

20x48 Wabstsr, Camp & Lane Corliss Hoist, double reel flat cable. Used nine months. Condition guaranteed. Immediate shipment.

THE S. H. SUPPLY CO., DENVER, COLO.

WANTED.

Wanted---Foreman for Concentrating Plant, 200 tone capacity, located in Colorado. Must have ability to earn \$300 per month. Address "Mill Owner," care of Mining and Scientific Press.

Wanted, Phosphate Deposits on the Pacific Coast.

Address L. T. W., Mining and Scientific Press.

THE CALIFORNIA DEBRIS COMMISSION, having received application to mine by hydraulic process a mass of debris in the Ruth Placer Mine, near Meadow Valley, Plumas Co., Cal., draining into Small Creek which reaches North Fork of Feather River, gives notice that a meeting will be held at Room 96 Flood Building, San Francisco, Cal., Jan. 5, 1903, at 1:30 P. M.

OFFICE OF GRANITE-BIMETALLIC CONSOLIDATED MINING CO.

PHILIPSBURG, MONT., October 15, 1902

Consolidation of plants and change to electric power permit us to offer, subject of course to prior sale, the Engines, Boilers, Machinery, etc., covered by the following list, at greatly reduced prices:

SECOND-HAND MACHINERY ON HAND.

ENGINES.

- 1 Fraser & Chalmers Cross-Compound Condensing Corliss Engine, 24 in. and 38 in. dia. x 60 in. cylinders, 500 H. P., with jet condenser. 1 team as above with Knowles Vacuum Pump and Condenser.
- 1 Fraser & Chalmers Corliss Engine, 18 in. x 42 in. 227 H. P. at 100 lbs., cut-off at $\frac{1}{4}$ stroke. 1 Hor. Atlas Engine, 8 in. x 12 in. 35 H. P. 1 Hor. Atlas Engine, 9 in. x 14 in. 30 H. P. 2 McIntosh & Seymour High Speed Engines 9 in. x 12 in. 30 H. P. 1 McIntosh & Seymour High Speed Engine, 7 in. x 9 in. 15 H. P. 3 Upright Engines, 8 in. x 8 in., 15 H. P.

AIR COMPRESSORS.

- 1 Ingersoll Straight Line Air Compressor, steam cyl. 24 in., air cyl. 24 in., stroke 30 in. 1 Ingersoll Straight Line, steam cyl. 16 in., air cyl. 16 in., stroke 24 in. 1 Norwalk Compressor, steam cyl. 14 in. L. P., air cyl. 16 in. H. P., air cyl. 10 in., stroke 16 in. 1 Knowlton Hor. Compressor Blower, steam cyl. 12 in., air cyl. 20 in., stroke 21 in.

BOILERS.

- 4 Hst. Tubular, 60 in. x 16 ft., 90 H. P. 1 Rot. Tubular, 60 in. x 12 ft., 70 H. P. 8 Rot. Tubular, 54 in. x 16 ft., 62 H. P. 6 Rot. Tubular, 54 in. x 16 ft., 63 H. P. 2 Rot. Tubular, 66 in. x 18 ft., 100 H. P. 2 Rot. Tubular, 52 in. x 14 ft., 50 H. P. 1 Hor. Economizer, 20 H. P.

HEATERS.

- 1 Tubular Heater, 20 in. x 9 ft. 1 Tubular Heater, 36 in. x 12 ft. 1 Tubular Heater, 18 in. x 9 ft. 1 Tubular Heater, 36 in. x 7 ft. 6 in. 1 Tubular Heater, 36 in. x 10 ft.

AIR RECEIVERS.

- 6 Air Receiver, 60 in. x 20 ft. 1 Air Receiver, 48 in. x 15 ft. 1 Air Receiver, 36 in. x 13 ft. 1 Air Receiver, 36 in. x 9 ft. 6 in. 1 Air Receiver, 42 in. x 8 ft.

PUMPS.

- 1 Knowlton Compound Condensing Duplex Plunger Pump, special pot-valve pattern. L. P., steam cyl. 23 in., H. P., steam cyl. 14 in. Dia. plungers 8 in. Stroke 24 in. Sooty vacuum pump 8 in. x 12 in. x 12 in. 1 Knowlton Compound Condensing Duplex Plunger Pump, 1 L. P. steam cyl. 18 in. H. P., steam cyl. 10 in. Dia. plungers 7 in. Stroke 18 in. Vacuum pump 6 in. x 12 in. x 10 in. 1 Knowlton Double Plunger Pump, special pot-valve pattern, 18 in. x 24 in. steam cyl., 8 in. plungers. 1 Knowlton Double Plunger Pump, same as above. 1 Station Pump, 14 in. x 16 in. cyl., 7 in. plungers. 4 Boiler Food Pumps, 8 in. x 10 in. cyl., 5 in. plungers. 3 Knowlton Sinking Pumps, 14 x 7 x 5 x 10 in. 1 Knowlton Sinking Pump, 12 x 8 x 6 x 12 in.

PLANERS.

- 1 Iron Planer, 7 ft. x 21 in. bed, plans 24 in. high, 24 in. wide, ways 9 ft. 6 in. long (Lath & Mortar).
- Tool Co., Worcester, Mass.) 1 Planer, 20 in. x 5 ft. bed, pade 21 in. wide, 24 in. high, ways 7 ft. 6 in. long. 1 L. B. Reed (Cairo, Ill.) Planer, plans 30 in. x 30 in. between uprights, 24 in. x 9 ft. 6 in. long.

LATHES.

- 1 Field Engine Lathe, swing 30 in. Dia. centers 16 ft., bed 21 ft. over all. 1 L. B. Reed (Cairo, Ill.) Lathe, swing 24 in. Dia. centers 8 ft.

DRILL PRESS.

- 1 Vertical Drilling Machine, table 30 in. dia.

BOLT CUTTERS.

- 1 Bolt Cutter, band or power, cuts pipe up to 2 in. dia. 1 Bolt Cutter, cuts pipe 1 1/2 in. and under.

DYNAMOS.

- 1 T. H. Motor, Type "E," 250 light, 110 volt. 1 T. H. Motor, 250 light, 110 volt. 1 T. H. Motor, Type "E-1," 200 light, 110 volt.

DIAMOND DRILL.

- 1 American Diamond Rock Boring Co., 115 Courtland St., New York Double cylinders 4 in. x 4 in., tube bore 1-7/16 in. Drills 1 1/2 in. hole. For steam or air.

For further information, prices, etc., address

WERNER ZIEGLER, Supt. Granite-Bimetallic Consolidated Mining Co., Philipsburg, Mont.

Second Hand Machinery.

ALL MACHINERY IS REBUILT AND FULLY GUARANTEED.

Many of the largest mines, mills and smelters are our regular customers. A good stock of all kinds of machinery always on hand. Send us your name and we will keep you posted on bargains in machinery.

S. S. MACHINERY COMPANY,

Office, 1529 Lawrence St. Denver, Colo.

Works, 6th and Market St.

Compound Pumps.

20x36x10x4x24 Knowlton Compound Duplex Condensing Independent Vacuum Pump and Condenser. Used five months.

14x26x8x4x18 Knowlton Compound Duplex Condensing, same as above. Used nine months. Condition guaranteed. Immediate shipment on both Pumps. 150 other station Pumps.

THE S. H. SUPPLY CO., DENVER, COLO.

For Sale, Cheap for Cash.

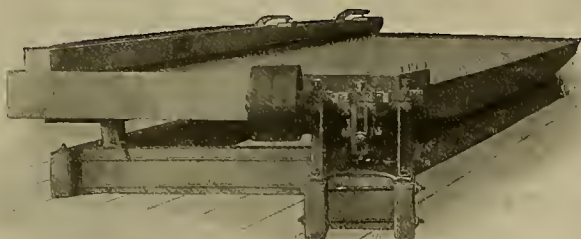
- 20-Stamp Mill,
- 1 Corliss Engine,
- 1-70 H. P. Boiler (good as new),
- 6 Concentrators,
- 2 Large Pumps, 1 Feed Pump,
- Some Belting, Fixtures, etc.

7 miles from Redding, Cal., 4 from Keswick.

H. C. Woodrow,

WHITEHOUSE P. O., SHASTA CO., CAL.

American Engineering Works, CHICAGO, ILL.



We are pleased to have the manufacturers of the Wilfley Table mention the Overstrom Table in their advertisements, and cheerfully return the courtesy. The Wilfley Table is a good table. The Overstrom Table embodies all the good points of the Wilfley with more available surface and closer capabilities of work. That this has been fairly demonstrated we will be pleased to show any inquirers. The point is, Do you want the better table? Can the better table be suppressed? Did the Frue vanner suppress the Wilfley because there were ONCE hundreds more Frues in use? The best things come last. Already hundreds of Overstrom Tables are in use, and the users like them for the values they save (more than can be saved in any other way).

G. E. HOSE COUPLINGS WILL PREVENT WASTE OF POWER.

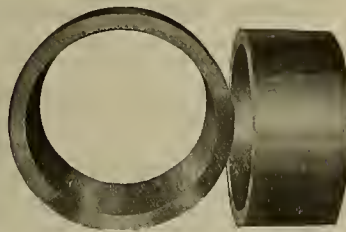
They are—

Durable, **Efficient,**
Absolutely Tight,
Self-Contained,
Suited to All Pressures,
No Outside Clamps.



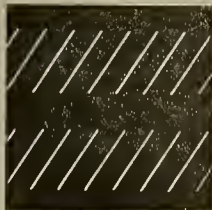
G. E. HOSE COUPLING.

Many dollars are annually wasted by leakage in compressed air lines. If you are a user of compressed air, this coupling should appeal to you.



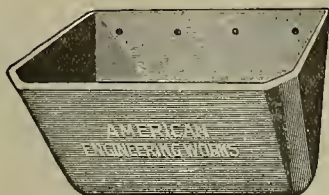
Steel Roll Shells.

If superintendents of Sampling and Concentrating Mills will give us sizes of shells they require we will keep stock for quick shipment of these sizes.



ROUND HOLE and DIAGONAL SLOT Perforated Metal Screens

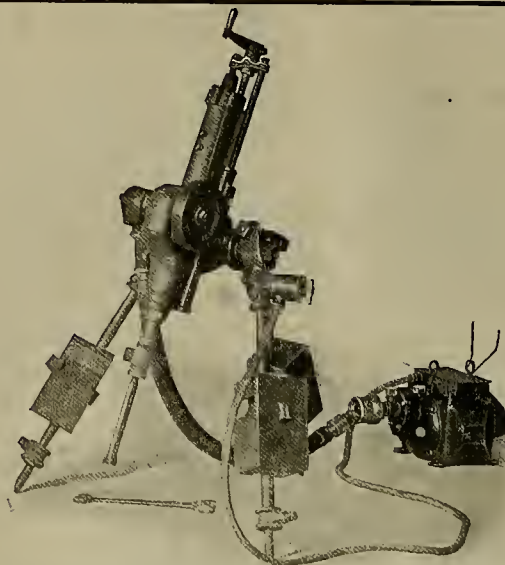
for Stamp Batteries, Jigs, Ore Mills and Concentrators.



E Style Malleable Iron Elevator Buckets.

Ever deservedly popular.
Giving the most wear for the money.

UTAH AGENTS: UTAH MINING MACHINERY & SUPPLY CO., SALT LAKE CITY.
CALIFORNIA AGENTS: RIX COMPRESSED AIR & DRILL CO., SAN FRANCISCO.



SAVES NINE-TENTHS YOUR POWER.

The Durkee Electric Drill

uses but one-tenth the power required by air drill of same size to do the same amount of work.

COSTS ONE-THIRD AS MUCH

as other drills to install.

Is electrically driven and no electricity enters the drill, therefore the men behind the drill are free from shocks.

Has no expensive steam or air pipes to keep in repair.

Has three speeds regulated by a simple speed controller. Stroke can be regulated from 2 to 5 inches.

IF YOU HAVE WATER POWER

think what you can do:

For those starting a mine on a small scale, and who cannot afford a complete steam plant, our drills and equipment are without question the cheapest, smallest and most compact plants on the market. In cases where the mine is isolated and fuel is very high, it would only be necessary to install a small gasoline-electric engine and dynamo to generate the electricity to deliver to the 2 H. P. motor that runs the drill, to furnish incandescent lights, and power for fans to ventilate the mine. Or, where a steam plant is already installed, it would require only a very small engine to run the generator.

FOR DETAILS, WRITE TO

THE WESTERN ELECTRIC DRILL CO.

101 East Broadway, BUTTE, MONTANA.

MECHANICAL Rubber Goods.

BELTING, HOSE,
PACKING.

MOULDED GOODS.

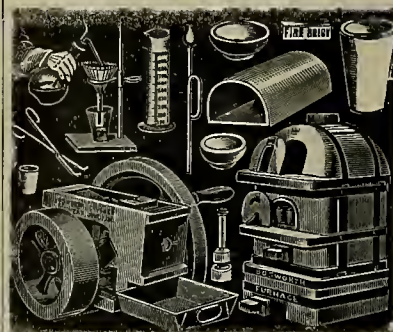
AIR DRILL HOSE,
PUMP VALVES.

Manufactured from best material to be obtained, and we obtain the best.
Samples and prices for the asking. Send for them to

THE DIAMOND RUBBER CO. AKRON, OHIO.

Denver, Colo., 1655 Blake St.
San Francisco, Cal., 8 Beale St.

THE DENVER FIRE CLAY CO., 1742 to 1746 Champa St., DENVER, COLO.



Manufacturers, Importers and Dealers in
Chemicals, Apparatus and Assayers' Supplies,
Fire Brick and Tile.
Sole Agents for the "AINSWORTH BALANCES."
WRITE FOR CATALOGUES.



Largest Manufacturer in
Joplin of
**MINING
MACHINERY**
OF ALL KINDS.
J. W. FREEMAN,
Joplin, Mo.
Correspondence Solicited.

If you can do business let it be known.

MINING AND SCIENTIFIC PRESS

Whole No. 2214.—VOLUME LXXXV.
Number 26.

SAN FRANCISCO, CAL., SATURDAY, DECEMBER 27, 1902.

THREE DOLLARS PER ANNUM.
Single Copies, Ten Cents.

The Forest Reserve and the Miner.

The object of setting aside certain timbered lands as a national reserve is primarily for the purpose of protecting the timber from destruction by lumber men, forest fires or otherwise, and to thereby secure as far as possible an abundant and regular rainfall. It has been repeatedly demonstrated that a country denuded of verdure soon becomes arid. The rainfall decreases, and in time the region becomes a desert. It is apparently the desire of the Land Department to protect the miner and not to set apart as timber reserve lands more valuable for mineral than for timber. The following provisions have a direct bearing upon this subject and are of interest to miners in timbered regions of the United States everywhere:

No forest reservation shall be established except to improve and protect the forests within the reservation or for the purpose of securing favorable conditions of water flows and to furnish a continuous supply of timber for the use and necessities of citizens of the United States; but it is not the purpose or intent of these provisions, or by the Act providing for such reservations, to authorize the inclusion therein of lands more valuable for the mineral therein or for agricultural purposes.

Upon the recommendation of the Secretary of the Interior, with the approval of the President, after sixty days' notice thereof, published in two papers of general circulation in the State or Territory wherein any forest reservation is situated and near the said reservation, any public lands embraced within the limits of any forest reservation which, after due examination by personal inspection of a competent person appointed for that purpose by the Secretary of the Interior, shall be found better adapted for mining or agricultural purposes than for forest usage, may be restored to the public domain. And any mineral lands in any forest reservation which have been or may be shown to be such, and to be subject to entry under the existing mining laws of the United States and the rules and regulations applying thereto, shall continue to be subject to such location and entry, notwithstanding any provisions herein contained.

To determine the value of undeveloped mineral lands, even approximately, is a difficult task. A single mine or limited district may upon development produce more value in mineral than all of the timber in the county is worth, and still in its unexplored, undeveloped state there may be no marked superficial indication of great mineral wealth lying beneath the surface.

That some steps must be taken by the Government to preserve the forests of the West is apparent, but



Ahijah's Grave, Ping-yang, Korea. (See page 370)

the destruction of timber is not accomplished by miners. In a few limited areas miners have denuded the forests for use in the mines, but in such excepted cases the mineral far outvalues the timber. It would seem equitable to set aside the forests, and at the same time permit the miner to prospect for mineral and to limit him in his use of timber to that growing upon claims owned by him, as already provided in the mining law, on condition, however, that should he cut timber on adjoining Government land he shall pay for the same at a uniform rate established by the Government. It would soon be observed that as quickly as this condition obtained there would be little doubt of the superior value of the land for mineral rather than for timber, which at once places it in the excepted class.

A Model Tunnel.

There are few mining tunnels constructed on the elaborate plan shown in the accompanying illustration.



Monarch Tunnel, Idaho Springs, Colorado.

tion, which is that of the Monarch tunnel, at Idaho Springs, Clear Creek county, Colo. It is a work of art, from the standpoint of both the miner and photographer. The method of timbering shown is one commonly seen in railroad tunnels but rarely in those of mines. It will be noticed that the tunnel is unusually large, having in the timbered portion room for three tracks. It will not be many years, probably, before most excavations of this character, intended for permanent use, will be supported by steel instead of wooden frames. The steel head frame is a comparatively recent construction, but is becoming common, and steel ribbed tunnels will soon be equally numerous.

With this issue is completed the first half of the 43rd year of this journal's existence—Vol. LXXXV. Forty-three years in the life of an individual or journal means a great deal, and while with the individual with age comes a more lenient standard of criticism, it is different in the case of a publication which with increasing years is justly deemed capable of greater demands and requirements. The province and purpose of this journal has ever been creative and constructive, and it has been its pleasure and its privilege through the years to advance the standing of the great basic industry of mining which it represents. It will be found foremost in the future, as in the past, and the record of its earlier years shall be but an index of its continued usefulness. Talking of indexes, the one for the past six months, appended herewith, is illustrative of the character of this journal—comprehensive, accurate and reliable; the index is equally illustrative of the class of people who read this publication—intelligent, practical men. This index, as all the other indices since 1860, is designed for the convenience of the mining public, and it is suggested that every subscriber should see that it is bound in with his volume for 1902. Meanwhile, for the 43rd time, the MINING AND SCIENTIFIC PRESS wishes its thousands of readers the world over a Happy New Year.

There is possibly a question as to the amount of sympathy a claim owner is entitled to who has failed to perform the assessment work required by law if his claim is located or "jumped" by another. The code of ethics in the mine location business is not clearly defined outside of the United States statutes.

MINING AND SCIENTIFIC PRESS.

ESTABLISHED 1860.

Published Every Saturday at 330 Market St., San Francisco, Cal.

TELEPHONE, DAVIS 771.

ANNUAL SUBSCRIPTION:

United States, Mexico and Canada.....\$3 00
All Other Countries in the Postal Union..... 5 00

Entered at the San Francisco Postoffice as second-class mail matter.

Chicago Office (Telephone, Harrison 73)737 Monadnock Block.
Denver Office (Telephone, Olive 733).....606 Mack Block.

J. F. HALLORAN.....Publisher.

San Francisco, December 27, 1902.

TABLE OF CONTENTS.

ILLUSTRATIONS.—Monarch Tunnel, Idaho Springs, Colo.; Kijah's Grave, Ping-Yang, Korea, 383. Supporting Loose Hanging; Construction of Chutes With Waste Rock; Stope Showing Chutes, 365. Pumping Plant at Utah Lake, Utah, 367. Electric Storage Battery Locomotives, 369. Mining and Metallurgical Patents, 371.

EDITORIAL.—The Forest Reserve and the Miner; A Model Tunnel; Close of the Volume: "Jumping" of a Claim, 363. Searching for Hidden Veins; Can Accidents Be Avoided in Mines? Cessation of Work of the Mountain Copper Co.; Experimental Work in Mining Districts, 364.

MINING SUMMARY.—372-373-374-375.

LATEST MARKET REPORTS.—376.

MISCELLANEOUS.—Concentrates, 365. An Economical Mining Method; The Pertencencia; The Square Set System of Timbering, 366. Utah's Irrigation Pumping Plant; The Experiences of a Working Miner; Iron Ore Shipments, 367. A Study of Amalgamation Methods, With the Object of Avoiding the Loss of Mercury; How and Why the Injector Works; Losses of Gold From Zinc Precipitate, 368. Mine Timbering in the Old Ironsides and Knob Hill Mines; Useful Notes for Electrical Engineers; Electric Storage Battery Locomotives, 369. "King Solomon's Mines," or The Land of Ophir; Geology of Southern Nevada and California, 370. Mining and Metallurgical Patents, 371. Personal; Commercial Paragraphs; New Patents; Notices of Recent Patents, 375-376.

Can Accidents Be Avoided in Mines?

Without doubt many of the accidents which occur in metal mines might be avoided if the miners themselves were more cautious, but to the miner surrounded constantly by danger, it becomes a mere incident in his calling and he is often careless through immunity from injury. Few men are injured in mines where the danger is apparent, for then the workman is alert and takes the necessary steps to avoid injury. Men are usually injured in some new and unexpected manner, and yet the accident might usually have been avoided. There are, however, some kinds of danger that can only be avoided by closing down the mine. Among the hidden menaces which cannot be detected until too late are those of missed or "cut-off" holes in the bottom of a wet shaft where sinking is in progress. The men drill a round of holes, charge them with nitro powder, often standing above their knees in water, before the work of loading is completed. The fuses are spitted and the men are drawn up the shaft. When the smoke and gas have been sufficiently dissipated, they or the men of the next shift proceed to clean up. All broken rock is shovelled up and loose rock is picked and gadded out. The men search as carefully as possible for missed holes. It is the practice everywhere for men changing shift to make known to the succeeding shift the number of holes drilled and spit, and the number of reports counted upon blasting. It is no uncommon thing for two or more holes to go at once, though sometimes a distinct report is heard for every hole. Some holes may be cut off, by one exploding a moment sooner than the next hole, and the primer and a portion of the powder in the cut-off hole explodes, leaving a quantity of powder in the bottom of the hole that had its upper portion cut off. This is the element of greatest danger to the shaft miner and its existence is not only unknown, but usually not suspected. He proceeds to drill, possibly for several hours, cutting a number of holes without mishap, when suddenly the drill strikes the fatal "cut-off" hole and every miner knows the result. How an accident of this kind can be avoided it is difficult to say. If the men spend several hours after each round of holes, in searching for cut-off and missed shots, the cost of shaft sinking would become prohibitory, and mining would soon cease.

The conditions described here actually occurred not long since in the Lincoln shaft, Amador county, Cal., and fortunately are of rare occurrence; but looking at the situation from a business standpoint, the miner must take some risks.

Searching for Hidden Veins.

The difficulties which beset the pathway of the prospector are many. The pioneer of the desert region has many hardships and troubles, but his work, that of searching for veins, is comparatively easy, for each vein usually outcrops strongly, and may be readily traced along the surface. Very different, however, is the work of the prospector in the north country, where the mountain sides are densely covered with timber, standing and fallen, and thick accumulations of debris, overgrown with moss and underbrush, hide every vein, often several feet below the surface. The alluvials of the neighboring canyons and gulches may give abundant evidence that veins exist on the adjacent hillsides, for the placer mines may have proven this to be so, which gives an incentive to the prospector.

Sometimes in the course of placer working the miner discovers a vein crossing the gulch in the bed rock. His method is plain—he follows it into the hill, or sinks a shaft on the rim at a convenient point, but what of the searcher who has not this good fortune?

In searching for blind veins, systematic work is usually the most expeditious and satisfactory, in the long run. The first thing to ascertain, wherever possible, is the true or probable strike of the veins of the district. Ordinarily, veins in any particular district have an approximate parallelism, and the direction of strike conforms nearly with the strike of the country rock, if the latter is at all slaty or schistose. Where rocks are mostly massive, that is, not slaty nor inclined to be schistose, the vein system is likely to be complex, the strikes running in many directions. In the latter case—fortunately not the most common, the difficulties of the prospector are multiplied.

Having ascertained the strike of the country rock, which may generally be observed in the bottoms of the gulches of the district, it may be assumed that the greater number of veins coincide with this strike, and prospecting work would then be directed across this strike. The quickest and simplest way to expose blind veins on a mountain side is to sluice out trenches down the hillside, but this involves the presence of a ditch or reservoir above, neither of which are usually found in new districts. In lieu of this, excavation in pits must be resorted to. The place to begin operations is in the bank at the side of the canyon where it is exposed by the stream having cut through it. If good float is found here it should be sought at a point up the hill. If a pit dug several feet up the hillside fails to disclose several pieces of similar rock, the probability is that the ore found in the bank at the bottom of the hill did not come directly down the slope, but has drifted down the gulch from some point above with its accompanying debris. Should similar ore be found in the pit first dug, without finding the vein, another should be excavated at a higher point on the hillside. Care should be taken to note the kind of material in which the pieces of detached ore are found and particularly the height above bed rock at which it is found. If this height is found to decrease as the excavations progress up the hill, the indications are that the worker is nearing the vein. Generally, too, the pieces of float are found to be larger as the vein is approached. It is the relative height above bed rock, however, which forms the main guide. This is explained by the fact that a piece of ore detached from the outcrop of a vein, whether it be exposed on the surface or not, is, when first broken off, close to bed rock, but it slowly makes its way by gravity down the slope, a process requiring centuries, possibly, and becoming mixed with the other detritus of the surrounding rocks, some of which is finely disintegrated, forming, with carbonaceous matter, soil, the piece of ore gradually reaches an increasingly greater height from bed rock as distance from its original position is gained. This process goes on much more rapidly on a steep slope than on a gentle one.

The search for the hidden vein is simply a process of following the detached fragments up hill to the source of their origin. This is the general principle underlying the quest of minerals of all kinds where the veins are buried from sight. All trenches should be made to bed rock, particularly as the work progresses up the hill, that the worker may not be misled and pass over the vein for which he is looking.

Where no float occurs on the hillside the difficulties are multiplied, and the chance for success is greatly lessened. In such cases, the absence of float may be due to the fact that there are no veins, but some veins have a crystallized or comb structure and the outcrops disintegrate into material so fine as to attract no attention from the prospector. In the search for gold this condition is met in a measure by panning carefully for gold, and it will be found, where gold exists, it will act in much the same manner as float quartz as above described, though the quartz will rise to a greater height above bed rock in a given distance than the gold. This indicates that the prospector may have to search much further to find the outcrop by following the gold than the float.

The most satisfactory method of prospecting extensively for blind leads is by means of a tunnel with crosscuts, but this contemplates the expenditure of a large amount of capital—either money or labor, or both, and the prospector usually being only able to supply one of these essentials, does not adopt a method requiring so large an outlay. Moreover, the tunnel is only justified when the outcrop of one or more valuable veins has actually been found.

The prospector should be a close observer and a good "judge of rock," that he may distinguish the various kinds of quartz or other rock he meets, one from the other, and not be led to follow worthless rock, by being unable to distinguish the different kinds of ore. The safest plan is to crush and prospect for gold, or have it assayed if for silver or base metals.

The biggest copper producer in California, the Mountain Copper Co. at Keswick, is idle. The former employees decline to work unless the mine officials recognize the local Miners' Union. This the mine officials decline to do. Between 700 and 800 men are affected. So far the most strenuous complaints come from the merchants of Keswick and elsewhere, who find their local business considerably curtailed. There is a complete cessation of all direct and indirect industries dependent for support on the operations of the Mountain Copper Co. The situation is an exact counterpart of what has taken place some time whenever and wherever mining operations or operations of any kind are undertaken on a large scale. The thing runs its course just as an epidemic or virulent disease in the human body. One can tell just how far it has progressed by the daily accounts. In the case of strikes, because of lack of Union recognition, they invariably result as a trial of strength; and, after considerable loss, which falls on the public, matters are patched up, there is a drawn game, and work resumes till next time. In the case of the Keswick, Cal., strike no new features present themselves. It is as usual as a case of measles or varioloid. A Smelters' Union had been organized, but as yet had not been "recognized" by the employers. At the smelter a man was run over by the slag train; because of that the train employees were discharged. They belonged to the recently organized Smelters' Union. A demand was made for their reinstatement. It was refused. Thereupon a strike was ordered by a minority of the employees. Then the employees of the Iron Mountain mine of the same corporation struck in sympathy. This stopped all operations. After a while one or two or three men will be seriously hurt, possibly killed; the local Union will promptly pass resolutions of disavowal and regret as to the sad occurrence; there will be the usual outcry about these things being so sad; considerable will be said and written, much of which will be so, and then the whole thing will become a reminiscence. It seems a pity that we should progress in these matters so slowly, and that there should be so much annual loss thus occasioned, but it seems as if it is only in that way these things work out, and such occurrences as that at Keswick, Cal., are as presently inevitable as the seismic convulsions of the globe.

EXPERIMENTAL WORK is being undertaken in many mining districts with a view of working low-grade dumps of oxidized ore without crushing, or crushing as coarse as it can be shown that the process will give satisfactory results. Cripple Creek, Colo., is a locality where this is attracting much attention. A scarcity of water where it is most wanted is somewhat of a drawback to the success of the project; but this will be doubtless overcome.

Concentrates.

IN blasting tough rock cut the holes with wider bits than those used in brittle rock.

IT is never safe to use a compartment of a shaft for a manway that is also used as a hoisting compartment.

NITRO POWDERS freeze at 42° F. They are then comparatively harmless. The danger is in thawing frozen powder.

THE relative merit of high or low discharge in a stamp mill, like the number of the screens, must be determined by experiment.

TUNGSTITE is a yellowish powder or silt-like substance occurring with wolframite, as a secondary product of the alteration of the latter.

NO MACHINE DRILL works well in soft, wet ground. It will cut rapidly and make muck so fast that it requires too much time to keep the holes clear.

SEVERAL MILES of Chile gulch, Calaveras county, Cal., has been filled with the tailings from gravel channel workings to a depth of 20 to 65 feet.

THE main difference between a machine gun and a rapid-fire gun is mechanical. The former is fed automatically and the latter is loaded by hand.

THE frequent breaking of pinions in hoisting engines is due sometimes to an improper setting of the engine. If the alignment is not perfect, great strains result.

A GOOD SIZED BOULDER may be broken by placing a stick or less of nitro powder on top of it, covering it with a few handfuls of mud and firing it as in blasting.

IT is unsafe to expose a quantity of giant or other dynamite in the neighborhood of blasting operations, as the concussion is dangerous and may explode the powder.

IRON SULPHIDE (pyrite) forms in the debris at the bottom of streams, that is, in gravel, mud and sand, presumably in a manner similar to its formation in veins.

THERE is no law as to the exact location of the bell line in a shaft, but it must be placed in a position where it is always easily accessible to men riding on skips, buckets or cages.

GRIT and dust may be prevented to some extent from working into a machine drill in cutting dry upper holes, by surrounding the piston bar below the chuck with a piece of gunny sack.

THE United States mining law permits a locator to take as many claims as he pleases, without limitation, but he must perform the required \$100 assessment work on each claim annually.

IN many mines carrying zinc together with sulphides of iron, copper and lead the zinc contents is found to increase in depth. Often the zinc is associated with high values in gold and silver.

TELLURIUM is of rare occurrence, but is found in Boulder county, Colo. The ores of tellurium are not uncommon, and are found in many countries, usually associated with gold and silver.

THE Fahrenheit thermometer registers freezing at 32° above zero; boiling water at sea level at 212° above zero. The Centigrade thermometer registers freezing water at zero and boiling water at 100° above zero.

IT is never economy to make the pump, air and manway compartment of a shaft smaller than other compartments of the shaft. As a matter of fact, more room is required in the manway compartment than in any other.

A SINKING LADDER should be durable and as light as possible, in order that it may be quickly handled when necessary. Ladders supplied with rounds made from 1-inch steam pipe are more durable than those having 1x4-inch staves.

A MAN is scarcely fitted, after working two weeks as "chuck tender" with a machine drill, to assume charge of the machine and pose as an experienced machine miner, yet many do this, to which the condition of the machine promptly testifies.

THERE is nothing in the statement that a certain machine drill is superior to another machine drill for the reason that one of them "strikes so hard that it shakes the ground loose." Ground so bad that it is shaken down by the blows of the drill should be drilled by hand.

WHEN big-grade slimes float upon the surface of water in vanner boxes or tanks and can not be made to settle on long standing, it will be found that if the overflow is conducted through a pipe and discharged beneath the surface of water, the finest of sulphides will settle to the bottom of the tank.

THE conditions found in ancient river channels are identical with those found in a modern stream under similar conditions. The process of channel making was the same then as now. The laws of nature are unalterable through all time, and like cause will produce like effect through the eons of ages.

WHERE a vein has a very noticeable departure in dip from the vertical, and the vein is intersected by gulches, the apparent dip is likely to deceive the locator. The true strike of a vein is at a right angle to its dip. If the true dip can be ascertained, the strike can be easily determined with sufficient accuracy.

OWING to the clayey nature of some gravel in ancient river channels it is mined and spread out on the surface for several months to disintegrate before sluicing, by

which means a much larger percentage of gold is saved. This material often pays for a rewashing after lying some months behind an impounding dam.

WOLFRAMITE occurs under a variety of conditions, associated with tin ores commonly, and also with gold, in Lawrence county, South Dakota. Sobeckite containing 67% of tungstic acid occurs in New Zealand, associated with gold. These minerals are easily recovered by concentration, being of high specific gravity.

A "BABY" DRILL is the name given to a machine drill having a 2-inch piston. A machine of this size, or 2½-inch, works well in ground not too hard and is particularly adapted to stumping and running raises, owing to the facility with which it may be handled, weighing much less than the large 3-inch or 3½-inch machine.

THERE are numerous instances in mines carrying sulphide ores where solid granulated iron sulphide without quartz proves to be practically destitute of gold or silver, while that accompanied by disseminated quartz is rich in the precious metals. Noted instances are found in the Rico district, Colo., and in Yavapai county, Ariz.

MINING CLAIMS taken as placer must conform as nearly as possible to the surveyed subdivisions of the land where they occur. Where the ground is unsurveyed claims usually extend from rim to rim—that is, to a point on each hillside bordering the gulch, 30 feet above the water line, and for 300 feet along the creek.

A LOCOMOTIVE or firebox boiler, also sometimes called a portable boiler, is convenient and less expensive than return-flue boilers, but the latter are far more economical in the use of fuel. Firebox boilers are seldom set in brick or stone foundations, but they should be covered with some material which will prevent too great a loss of heat.

THE name "fluorine" as applied to ores of Cripple Creek is a misnomer. Fluorite is the proper name of the mineral, a combination of fluorine and calcium (fluorspar) or "tuff," as it is known in Cornwall where it is common in lead and zinc mines. Its appearance in Cripple Creek ores or elsewhere cannot be taken as an index of value.

SOME of the large chlorination tailings dumps of California are those at the Plymouth Con. at Plymouth; Barney's Works, Drytown; the Vauclaves Reduction Works, Sutter Creek; Kennedy and Zella mines, Jackson, Amador county; Utica Chlorination Works, Calaveras county, and the Rawhide and Golden Gate Works, near Sonora, Tuolumne county.

WULFENITE is a yellow mineral usually occurring in tabular crystals, or in an aggregate of grains, or else disseminated in fine scales through the rock. It is molybdate of lead and is often mistaken by inexperienced prospectors for gold, owing to its bright yellow color and heavy specific gravity. It is common in the quartz veins of Nevada, Arizona and southern California.

EUCALYPTUS is a native of Australia, but has been transplanted extensively in the western part of the United States, where it grows rapidly and appears to thrive. The timber is used largely in Australian mines, and round sticks are said to be satisfactory. Sawed eucalyptus is not as good as pine, however, owing to its changing grain. It is not as yet employed in timbering mines in America.

UNSKILLED MINERS usually prefer heavy hammers with few blows. Expert miners a lighter hammer and quick blows. The latter accomplish more work. In some Spanish-American countries the natives are often seen striking single-handed with a ten-pound hammer, having a handle 18 inches in length. These men look with disdain upon a 34-pound hammer—an implement that they think is only fit for boys.

AMONG the oldest placer deposits known to geological science are the gold-bearing conglomerates lying at the base of the Cambrian formation in the Black Hills of South Dakota. These conglomerates are found at Lead and Central City, at and near the Homestake mine; at Rockerville, in Pennington county, and in Bear gulch district, Lawrence county. These ancient placers are the result of a shore deposit and are not river deposits, like those of California.

THE cassiterite (tin oxide) found in the Bear gulch and Harvey peak regions of the Black Hills, South Dakota, occurs in dikes or veins of coarse-grained granite which cut through the mica schist of the country. Some of these dikes are more than 100 feet wide. They also contain black and green tourmalines, rose quartz, orthoclase and albite and other triclinic feldspars, white and vitreous quartz, spodumene, apatite, wolframite, columbite and other minerals usually considered rare.

THE principal mineral region of central or equatorial Africa is in the southeastern part of the Congo State, in the Katanga region. The mineral country extends southward into Rhodesia and beyond, toward the Cape. There are numerous old workings in the Katanga region, which is said to be rich in copper and iron. The natives are expert, in a manner, in manufacturing iron from the ore and making it up into various implements for domestic use and for war. Early travelers in Africa tell of the natives shooting bullets of copper ore from their smoothbore guns.

NITRO POWDER never becomes too old to cease being dangerous. It may lie around for months exposed to the sunshine, wind and rain and many changes of temperature, having a wide range, but it does not render the

powder harmless, although it may become unsuited for use as a blasting agent. A quantity of old powder which had lain out in the weather for more than a year was exploded with sufficient force to destroy everything near it by shooting a rifle bullet into it. This lot of powder formed an element of great danger, though unsuited to blasting.

PETRIFIED or silicified wood is abundant in the ancient river channels of California. The trees which grew along the banks of ancient streams have either fallen into the stream and been buried beneath the gravel, or have been surrounded by the stream of volcanic mud which swept down the canyon, enveloping everything. In this condition the trees were turned to stone (became petrified) or decayed, leaving a cylindrical hole where the tree had stood in the solidified volcanic mud and sand. Occasionally though rarely the portions of the trees have become carbonized.

WHAT is known as the Knox system of blasting is employed in quarry work and not in metal mining. The system is used to split off any desired width or length of stone from a large mass, such as often occurs in granite quarries. The method is to drill two holes about 1½ inch in diameter, 8 inches apart and extending two-thirds of the distance through the mass of rock from which the block is to be given. These holes are placed directly on the line of proposed fracture. They are charged with black powder or "low dynamite," and an air chamber or space is left between the top of the charge of powder and the tamping. The holes are fired and recharged repeatedly until the block is split along the line of desired fracture. In some cases this break will extend in a direct plane for 50 feet or more in homogeneous material, such as granite.

A CROSSCUT TUNNEL of great length to develop veins at depth is only justified when the value of the veins have been proven in their upper portions. Many promising mining ventures have been wrecked by exhausting all available funds in driving long and expensive tunnels, which failed to develop wealth before financial disaster overtook the company. Often the ore shoot is divided into irregular sections, and should the crosscut reach the vein in one of its poorer portions it might result in an entire suspension of work, where its continuation would mean success. As a general plan it is always advisable to develop the vein where values are, if not uncertain, at least where they may be proven at least expense. Later, where this expense of crosscut tunnels, or shafts through country rock is justified by actual development of the upper portion of the vein, extensive workings of the character stated are not only desirable, but it is good business to have them, as by their means the general cost of mining operations is decreased.

THERE is a way of getting water into a boiler without pumping it, where a light pressure is available. The apparatus consists of a tank, made strong enough to stand full boiler pressure, mounted above the waterline of boiler, connected to the shell by means of a pipe that discharges below the waterline, fitted with a good valve so that all connection between tank and boiler can be shut off at pleasure. This valve is shut and the tank filled with cold water, after which the supply is shut off and the valve in connecting pipe opened, thus equalizing the pressure and allowing the water to run into boiler by force of gravity only. While it is plain that no power is used in pumping water into the boiler, yet no remarkable saving is effected by it. Take a 100 H. P. boiler for example, in which case the pump would develop .348 H. P.; assuming that it requires five times as much as a good engine it would be equivalent to .348 × 5 = 1.74, or say 2 H. P. when friction is included. This is all that can possibly be saved by this plan, and as the whole power is 100 the saving cannot be more than 2%.

THE rounded, boulder-like appearance sometimes observed in rocks found in situ is not due to erosion, but to a peculiar process of oxidation and alteration known as concentric decomposition. This condition is often found at or near the surface, and sometimes in deep levels of mines, where there has been an extensive alteration of the wall rocks of the crushed rock mass within the zone of mineralization. By the process the outer portions of angular-shaped blocks or masses undergo decay, the decomposition progressing from the surface inwardly, the process seeming to develop a series of concentric layers or shells, one within the other, enveloping the nucleus, which is often but little, if at all, altered. Undoubtedly the structure of the rock, in cases where this peculiar decomposition appears, was originally concentric, a condition possibly assumed when cooling from the molten magma, but which would be unobserved were it not for the decay of the mass. In regions where this condition obtains in massive rocks, such as granite, diorite and many porphyritic rocks, the surface of the country is seen to be strewn with boulders of various sizes, from small cobbles to great masses of many tons weight, and these latter in the neighborhood of towns are often worked up into building stone or used for other purposes. The fine material which generally composes the surface in such regions is often soft and much decayed. Not infrequently many of these boulders may be observed to rest on cup-shaped shells, which are portions of the original rock mass that has resisted decay somewhat longer than the balance of the rock to which it belongs. In some mines this peculiar progress of the alteration of the original rock is observed, as at the Basick mine in Colorado, and at the Darien mine at Cana, Colombia, S. A.

An Economical Mining Method.

TO THE EDITOR:—In your issue of the 6th inst., under the caption, "An Economical Mining Method Required," your inquirer, who is striving to "round corners and polish ragged edges," may possibly find a solution of the difficulty in the very material he is troubled with, namely, the blocky waste. The description of the property which is such a problem to

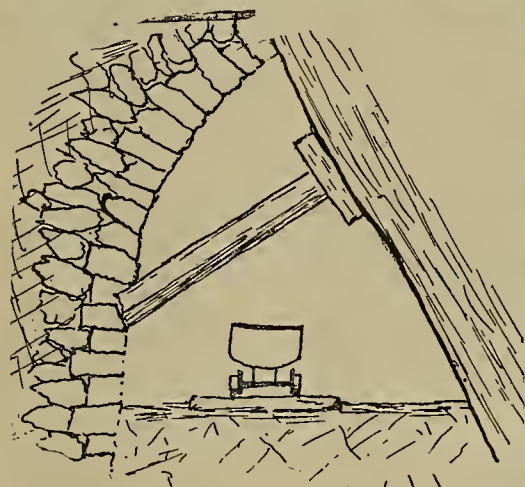


Fig. 1—Supporting Loose Hanging

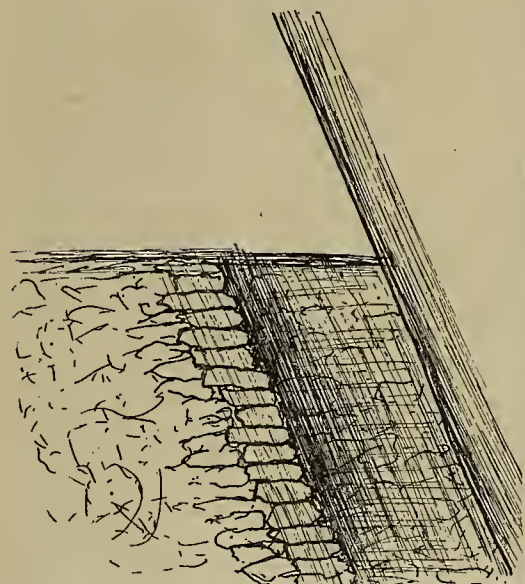


Fig. 3—Construction of Chutes With Waste Rock.



Fig. 2—A Retaining Wall.

the future working of the leaner ores; there was a long haul from the mines to the concentrator—over three miles; the ground was heavy, as the district had been a zone of great earth movements, forming innumerable local faultings and clefths; timber was costly, hence the greatest care had to be taken to exercise economy in every branch of the mining operations. The silver-lead deposit was in the form of a series of fissure veins in the metamorphosed sedimentaries. The foot wall of the main lode was well defined, but no definite hanging wall could be found. The mineral occurred associated with the country rock, sometimes in the form of stringers, but more often disseminated irregularly throughout the schists and vein filling. The best ore made on the foot wall.

Overhand stoping was resorted to whenever practicable. A series of raises would be put up from the main level to a height of about 30 feet, following the foot wall of the lode, and stoping would be commenced on either side along the strike of the ore body. The main drifts would be kept intact either by timbering, by building retaining walls with the lumps of dead rock broken down, or by a combination of the two. (See Figs. 1 and 2.)

As the stopes were carried up, mill holes at intervals of 50 feet and manways were built of the "deads." (See Fig. 3.) Nothing was wasted. The miners sorted all the rock broken, the ore was put into the "chutes," the larger pieces of rock stacked up by themselves for the "wallers," and the small pieces and fines made the floor of the stope. I used to keep two men doing nothing else but building these retaining walls, mill holes and manways. They were paid at the rate of 1.30 marks (about 33 cents) per square meter of walling. No cementing material of any kind was used, and if properly built, the walls stand a long time without any repairs.

Should the roof or walls of the stope become heavy, that portion was temporarily secured by means of a post and cap until a wall would be built to support it, when the post was drawn, so that practically no timber was lost by this method, and the stopes were kept in a safe condition. In nearly all cases sufficient waste was obtained to keep pace with the filling, but at times it would be necessary to get more, and this was done by cross-cutting toward the hanging wall. These crosscuts served a double purpose, in as much as they made up the deficiency of waste and explored new ground. Just as fast as the rock was broken down, it was sorted and the ore put into the chutes. None of the ore was allowed to accumulate in the stopes. The chutes were emptied as often as we were hoisting from that level. In the larger stopes I would often have as many as six gangs of men working. A raise would be put up in the middle to the height of the next stope to be carried forward, then we would work both ways to the breast, the filling being kept up with the stoping so that the men always had a good floor on which to work and sort the rock. (See Fig. 4.)

All the men were put on contract, there were no "daily wages" paid in the stopes, and our mining costs were reduced to a minimum. In the terms of the contract the men broke the rock, sorted it, trammed the ore to the chutes, made the floor of the stope, and kept the roof and walls safe. I had no trouble whatever with this system, and was able to economically extract the ore from a very difficult mining proposition.

From your inquirer's remarks, I should think that this system could be applied in his case, the main things being to keep the filling up with the ex-

mining industry. The outlook for the coming year is promising, particularly in the gold mining regions, as with rising prices for almost everything except silver, gold will be in greater demand.

The Square Set System of Timbering.

TO THE EDITOR:—Referring to MacDonald's suggestion to Woakes' inquiry relative to timbering an ore body wherein trouble is feared by reason of the vertical inclosing walls and difficulty of holding the ore in place until ready for mining, I recall some work done in the Chapin iron mine in Michigan, where great difficulty was encountered in holding the ore body up on timbers. It was then determined to let the ore "come." This was accomplished by slicing horizontally from foot to hanging walls, taking out from 20 to 40 feet wide and about 7 feet in length, using but very slight timbers and allowing the ore body to cave this height. A new slice was started after allowing the caved portion a short time to settle and become partly compacted. There was no difficulty found in having the ore cave between the walls, filling of waste rock was run in upon the top of the portion being caved. Another method of mining followed at the Norrie mine on the Gogebec range in Michigan offers some suggestions to Mr. Woakes. Here the ore body is of soft hematite, containing about 8% moisture; the ore body is practically half a mile long and in places over 300 feet wide. Square sets are used. The shafts are in the foot wall and drifts parallel to the ore body vein in the foot wall. The ore is attacked by taking out the ore from foot to hanging walls by room and pillar method, the rooms being four sets (26 feet wide), and pillars three sets (about 19 feet wide). These pillars are again cut by drifts parallel to the foot wall to facilitate tramping.

The rooms are filled with waste rock and the pillars removed by driving into their center and then to the hanging wall. When this is reached drifts to the right and left are started and the ore removed by drawing back. When the hanging shows signs of caving the entire face is lagged up and miners are withdrawn until the cave has taken place. After an interval of, say a week, the men again attack the ore by going to the caved face and working behind the cribbing and fallen rock. By this method the miners are constantly protected from falling material and have solid ore on their right and left.

It seems to me that by following Mr. MacDonald's suggestion there would be only the one place for men to work, namely, around the two-compartment up-raise. The room and pillar system filling the rooms with waste affords a number of faces to workers. Now that the costs for this work are not exorbitant is shown by the fact that for years of the panic of the '90's the ore from this mine was not worth more than \$3 per long ton on the cars. I am not acquainted with all the difficulties that faced Mr. Woakes when mining his ore body, but the foregoing suggestions are offered as methods whereby soft ore bodies may be safely and economically mined.

RICHARD A. PARKER.

Hot Springs, N. M., Dec. 18.

The Pertencia.

In Mexico the "pertencia" is the unit of measurement in mining claims, comprising 10,000 square meters. The law requires that it shall be square where possible, but must in any event contain the full amount unless it shall be a fractional claim, surrounded by others. The boundaries are vertical

your contributor, is altogether too inadequate to allow of any real advice being given, but an outline of the method I employed while mining a low-grade silver-lead proposition in the Lower Hartz, Germany, may act as a guide, or suggest some scheme for the handling of the property in question.

We had at the Neudorf mines, Anhalt, Germany, many difficulties to contend with. The mines had been worked a number of years, the richer portions had been worked out, no heed having been taken for

cavation, get the ore into the chutes as quickly as it is broken down, and utilize the larger pieces of barren rock for building the chutes and manways.

FRANK H. PROBERT,
Consulting Mining Engineer.

230-31 Bradbury Bldg., Los Angeles, Cal.

THE statistics for the year now drawing to a close will show an increased activity, with a material augmentation of output in almost every branch of the

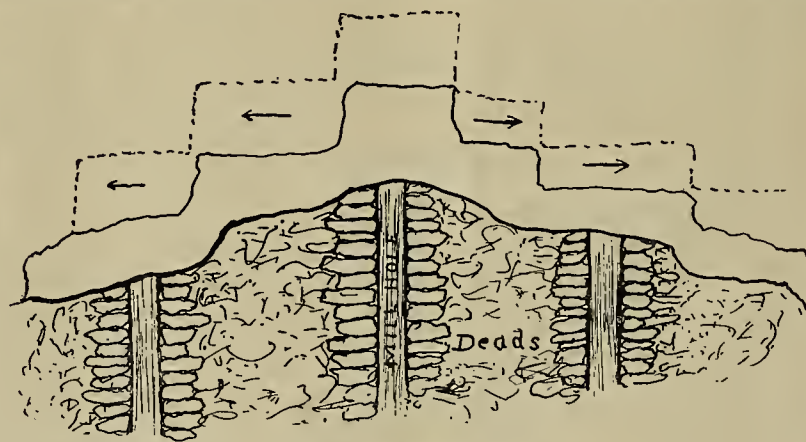


Fig. 4—Stope Showing Chutes.

planes and there are no "extralateral rights"—a distinguishing feature of claims in the United States and the most prolific source of mining litigation. The pertencia does not convey with it any right to surface ground, being in the form of a right to mine only. The owner of this privilege pays \$10 annually in Mexican money to the Federal authorities, and in the event of failure to pay he is given but ninety days grace, at the end of which time he forfeits his pertencia if the tax still remains unpaid.

The Experiences of a Working Miner.

Written for the MINING AND SCIENTIFIC PRESS.

You may remember that two or three years ago I sent you some of my experiences among the mines. Well, since then I have had other and different experiences, and perhaps some of them may prove interesting and possibly also instructive. I know miners have to be handled with gloves—some of them not the four-ounce variety, but fine kid gloves. I know a miner, and a good one, too, who has been foreman for several years of a large and very interesting gold mine in California. He is not a student, in the ordinary acceptance of the term, but he studies his mine and understands it well. One day a noted geologist visited the mine and in company with the superintendent spent several hours underground. The vein phenomena of this mine, the W—, at S—, is of great interest to the student of geology, and the stranger being an ardent and capable student of dynamic geology, found much to interest him and abundant food for thought.

The foreman, who has an eye to the economic branch only, accompanied the party for some time and finally left in disgust, finding some excuse to get away.

I saw him shortly after and he said: "That professor is the strangest man I ever saw. Damme, he stood and talked for an hour about a little stringer that cuts out into the hanging, when here was a fine vein 25 feet wide—all good ore, an' he never looked at 'en. Talked about ore deposits and genesis and such. Now, I've read Genesis myself, and I'll swear I never saw a word about ore deposits in the book."

* * *

I had a long talk one day with S—, superintendent of the U— mine in C— county. I had known him for some time and expected to get some authentic information concerning the mine—something everybody in the district was anxious to get. This man told me he had been placed in a most unenviable position, having "to work out the tail end of a gutted and badly worked mine. Had to get what he could from the several caved portions and to mine wherever he could find a little pay." All this sounded straight enough, but was not in line with certain other things that had come to my notice, such, for instance, as the building of a new and very expensive hoisting plant at a deep and well equipped modern shaft. It was not known to be the policy of the owners to go to such extraordinary expense to work out the "tail end of a gutted mine." The mine is still in operation and is doing well, new ore bodies having necessitated the elaborate equipment. I merely considered the remarks of the superintendent to me to be a mild form of rebuke for presuming to ask about matters that really did not concern me, although it always seemed to me he could have made the interview shorter by telling me it was none of my business.

* * *

There are mine "supers" who occasionally show appreciation of the efforts or knowledge of the men in their employ by giving them a small increase of pay, and there are men who are the recipients of favors of this kind who cannot stand prosperity of this sort. T— was one of the gang working in the big cut at the B— mine. The superintendent directed T— to look after the men on this job, to see that they were not injured by falling rock, etc., and for this T— was to receive a small additional sum per day. T— almost immediately assumed the airs of general manager and became "bossy," which was not exactly the intention. T— also put in a good portion of the time sitting down and found much solace in his pipe while he watched the rest of the gang at work. I never asked T— whether or not he knew how it was he was sent to the office to "get his time," instead of being made "super."

* * *

B— put in an extensive, and incidentally, expensive plant at L— to work tailings by a newly discovered method. Numerous experiments in the laboratory had been made and these were said to be eminently satisfactory. When the plant was put in operation, however, the mead of satisfaction was ridiculously below par. B— then admitted that his laboratory experiments were not all that could have been desired, but he had hoped to be able to correct deficiencies in the process when operating on a commercial scale that he had been unable to remedy in the experimental work of the laboratory. Ordinarily the laboratory results are more satisfactory than those obtainable in a large plant, and there are few who have confidence in their resources to such an extent as to expect, or to hope, that shortcomings of the process in the laboratory are to be remedied in the commercial plant.

* * *

Not long since I visited B— O— district and found the camp sinking into quietude after a regular boom. I had never thought much of the camp in former days, and I was interested in learning on what the "boom" had been built. Briefly, on noth-

ing. There were veins enough, but values were low and scattering. A score of holes had been sunk, some of them equipped with good hoisting plants, and one outfit even had a mill with no ore. Many thousands of dollars were wasted. There is one good mine in the camp and one only. On one dump I found 300 tons of worthless glassy quartz neatly piled, a door barred entrance to the tunnel, and a conspicuous notice on the door read "Positively no talking with the millman." As the property was not equipped with a mill it is safe to say that the notice was not posted by the management. Whatever might have been said by the "millman" could scarcely have damaged the property.

Utah's Irrigation Pumping Plant.

Written for the MINING AND SCIENTIFIC PRESS by C. W. ARTHUR.

The irrigation pumping plant at the outlet of Utah lake, Utah, one of the largest, if not the largest pumping plant in the world, is completed. This plant was built by several canal companies controlling the waters used for irrigation purposes in the Great Salt Lake valley.

Utah lake is 30 miles from Salt Lake City and covers an area of about 375 square miles. Its principal source of supply is the streams flowing from Spanish and American Forks and Provo canyon, together with a few smaller streams which only flow

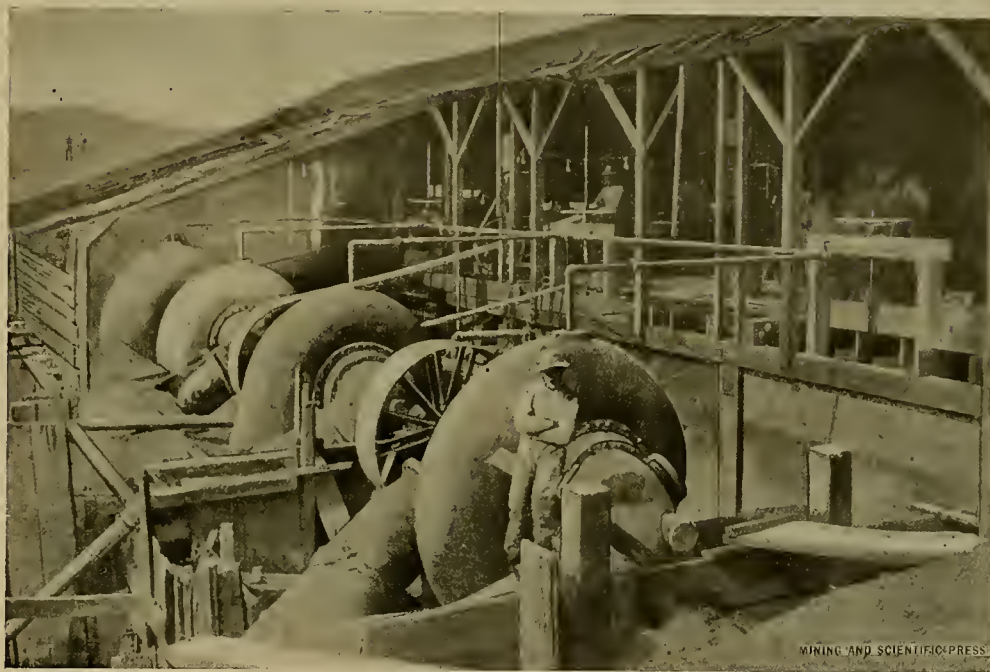
potential of 16,000 volts, to the motors at 500 volts, through three Westinghouse step-down transformers of 170 K. W. capacity each.

The pumping plant is about 300 yards from the lake outlet. A new channel has been cut from the river, and the pumps placed directly in the channel on a platform having piles as a base. A dam was constructed across the stream, the pumps raising the water in the river at their outlet about 3 feet higher than it was at the intake. Six gates, west of the pumps, prevent the water from flowing back into the lake. These may be raised when the lake level is higher, so that the river may take its natural flow.

At the time that the first two pumps were installed in the early part of August, the river's flow was little more than necessary for the farmer's domestic requirements. An official measurement of the lake recently made gave the level at 3 feet, 9 inches below compromise point, which is 3 feet, 1 inch below low-water mark. Mr. J. Holdsworth, who has taken the measurements for the past three years, says but for the pumps the bed of the river would be dry.

The pumps are supplying water for 20,000 to 30,000 acres of land which would be practically worthless were it not for the Utah lake supply. It is estimated that the partial saving of the beet crop, the making of a third crop of alfalfa, and the saving of trees in Salt Lake county this season has almost paid for the pumps.

The practical success of the pumps is not doubted,



Pumping Plant at Utah Lake, Utah.

during the spring months. Its only outlet is the Jordan river which flows through Salt Lake City, emptying into Great Salt lake.

By agreement of owners of lands adjoining Utah lake the several canal companies have acquired the right to raise the waters of this lake 3 feet, 3 inches above low-water mark, known as the compromise level. At present the water in the lake is lower than at any time in its known history, and as a result is inadequate to the demand made by the farmers upon the several irrigation canals.

Forseeing this during the irrigation months, and to save several thousand acres of this year's standing grain, the Utah & Salt Lake Canal Co., the South Jordan Canal Co. and the North Jordan Irrigation Co., who take water from the west side of the river; the East Jordan Irrigation Co. and the Salt Lake Corporation (representing the Salt Lake Canal companies, the latter supplying the city of Salt Lake), taking water out of the east side of the river, decided to build a pumping plant at the head of the Jordan river for the purpose of pumping the waters of the lake into the Jordan river, thus giving the several canal companies sufficient water for the farmers of Salt Lake valley. The above companies for years have been joint owners in Utah lake, and that right has the sanction of court by right of long usage.

The plant as constructed consists of four 40-inch double-suction, special low-running, centrifugal pumps, of the Byron Jackson type, fed with a Y. P. suction of 40 inches diameter, terminating in a 48-inch discharge. Each pump has a discharge of 100 cubic feet per second, under a 5-foot, 5-inch head. The pumps are primed by a vacuum pump driven by a 5 H. P. motor. Each pump is driven independently by a 100 H. P. Westinghouse, type "C" induction motor, operated at 530 revolutions per minute, provided with auto-starters. Power is furnished by the Salt Lake City Water & Power Co., whose plant is 12 miles distant. The current is transmitted at a

and harring the institution of an injunction suit, threatened by the owners of land bordering the lake, the beneficial effect of providing a largely increased flow of water from the canals will be felt by all the farmers in the valley.

The city of Salt Lake is to pay 25% of the cost of the plant, to provide for the wear and tear of the machinery, the amount thus paid to apply on the purchase price of the plant. The city is also to pay one-fourth of operating expenses, about \$2000 per month, and interest on the investment—the city to receive one-fourth of the water pumped into the Jordan.

The work of construction was under the supervision of F. P. Kelsey, engineer for the canal companies, F. Langsten in charge of the construction of plant, and T. E. Daniels, electrical engineer for the power company. The total cost of the plant is \$50,000.

Iron Ore Shipments.

The total iron ore shipments from the northern lakes will probably exceed 25,000,000 gross tons for the year. This will be double the business of so recent a year as 1897, and equals all that was shipped from 1855 to 1884. It is a larger percentage of the total ore production of the United States than ever before, except in 1899, and is 74% of the whole mined in the country. There will be, it is estimated, a total of about 35,000,000 tons of iron ore mined in the United States this year. Of the whole amount shipped that from Minnesota will exceed 15,000,000 gross tons. The increase in iron ore shipments this year is the greatest in the history of the State. The total shipments last season were 10,790,953 gross tons. Minnesota has five mines whose aggregate shipments this year will show a total of nearly 7,000,000 tons. These are the Adams, 1,250,000; Stevenson, 1,400,000; Mountain Iron, 1,500,000; Mahoning, 1,025,000, and Fayal, 1,800,000, gross tons.

A Study of Amalgamation Methods, With the Object of Avoiding the Loss of Mercury.*

NUMBER II.

By MICHAEL BUSTAMANTE, JR., M. E., City of Mexico.

II. THE PATIO PROCESS.—Subsequently, I had occasion to occupy myself with the treatment of ores by the patio process. The ores consisted of a quartz mass, carrying a mixture in variable proportions of miargyrite, polybasite, silver glance, pyrites, oxides of iron and manganese, and finally some native silver and calcite; zinc blende was occasionally present.

The plant comprised 50 stamps of 850 pounds; 30 arrastras; 4 mechanical washers; a patio (yard) with a capacity of 1360 tons; and corresponding apparatus, operated by abundant hydraulic power.

All the theories known to me regarding the reactions of the patio process are inconsistent with the phenomena observed in practice. As a consequence, the process, empirically, and more or less ignorantly, performed, has often been unfairly discarded by reason of failures due in reality not to its principles, but to its improper application.

Frederick Sonneschmid, who was sent to Mexico by Charles III of Spain, with the idea of introducing there the German methods of treating silver ores, did not hesitate to report that the patio process was superior to the barrel amalgamation developed by Born and his successors.

Sonneschmid assumed that the magistral, in which he regarded the copper sulphate as the chief operative reagent, liberated from the salt hydrochloric acid, which transformed to silver chloride the metallic or sulphuretted silver contained in the ores; and that this silver chloride, in the presence of the excess of salt or hydrochloric acid, was reduced to the metallic state, and amalgamated with part of the mercury, giving up its hydrochloric acid to another part, to form mercury chloride. In addition to the mechanical loss of mercury in the process, there was thus a double chemical loss, due to the formation of mercury chloride, partly by the hydrochloric acid from the silver, and partly by the free hydrochloric acid in the mass.

This theory, as further developed, but not essentially changed, by Karsten, and Rammelsberg and Regnault, has been generally adopted. Up to a certain point, it explains the most important phenomena of the process.

The consumption of mercury in this process is generally measured in its proportion to the amount of silver obtained. A loss of 12 ounces of mercury per mark (= 8 ounces) of silver extracted is generally considered good practice; and it is commonly reckoned that of the 12 ounces, eight constitute the chemical loss, and four the mechanical. But when docile ores are intelligently and carefully treated, the loss of mercury may be less than 3.25 ounces per 8 ounces of silver—a fact which disproves the theory that the silver chloride is reduced wholly by the mercury—since this loss is much smaller than the chemical equivalent involved in such a reaction.

Experiments made in 1878 at the Hacienda de Regla, by my father, Eng'r Miguel Bustamante, showed that when the quantity of salt was augmented, and the treatment was slightly "cold," the total loss of mercury never exceeded 4 ounces per mark of silver extracted.

By another series of experiments, made to ascertain the influence of impurities of the sulphate of copper employed, he demonstrated that the English sulphate of copper, the purest used in Mexico, did not give as good results as the acid sulphate of copper produced by the Mints in treating gold; and, finally, that the most effective and economical of all is the impure sulphate of copper, with a large quantity of iron, known as "magistral," and obtained by the roasting of chalcopryite.

These results, repeatedly confirmed by myself and others, likewise contradict the generally admitted principles and theories cited above.

The fact is, that some of the reactions pointed out by theoretical chemists take place; but there are a multitude of other reactions which may and do also occur; and the necessary ingredients of the ore have no less (and probably even more) influence in the patio than in other reduction methods, because the latter may neutralize, by means of appropriate mixture of charges, some of the elements disturbing the desired reaction; whereas in the patio no one has taken pains to make such mixtures, but all are content simply to divide the ores into "docile" and "rebellious."

This is not surprising, since the greater number of plants are in the hands of ordinary amalgamating workmen, ignorant of chemistry and mineralogy, and attached to the routine practice of their fathers. Regular dokimastic assays are rarely maintained, and still more rarely used with advantage as checks or guides in daily operations. The assays of the residue are carelessly made, and the treatment is generally guesswork. Nevertheless, the general results

in treating "docile" ores are good. If the loss of mercury could always be kept down to 4 ounces per mark of silver obtained, and the extraction of silver and gold up to 95% of the assay value, and if this could be done with a larger proportion of the "rebellious" ores, the patio would be the ideal method of this country.

Some ten years ago, as a student of metallurgy, I presented, in my examination thesis, a theory of the patio process which I wish now to re-state, without pretending that it solves the whole problem, but believing that it takes account of certain reactions, constantly occurring in the process, which have been overlooked hitherto, though they have a marked influence on the result of the treatment.

The first chemical operation upon "docile" ores is the salting (ensalmarar), which consists in the addition of chloride of sodium (from 1.5% to 4% of the weight of the ore). The salt should be as pure as possible, as its quality has a marked influence on the consumption of sulphate of copper afterwards, and on the pureness of the silver, as well as on the time spent in making up the torta.

In the majority of cases I have found the use of an excess of nearly pure salt to result in greater silver extraction, saving of time in the treatment, and notable diminution in the loss of mercury.

After the mixing (repaso), which may be done by peons, horses, rollers, pans, cradles, Archimedean screw, Chilean alacran, arrastras, etc., comes the "incorporation" of the sulphate of copper, or the magistral, and then of the mercury. The quantity of copper sulphate added (varying from 1.5% to 6% of the weight of the ore) depends upon many circumstances, the principal being the dullness of the workmen and the good or bad quality of the impure sulphate employed. The quantity of mercury added is calculated to be four or five times the weight of silver expected to be obtained at the end of the operation.

(TO BE CONTINUED.)

Losses of Gold From Zinc Precipitate.

TO THE EDITOR:—In your edition of Nov. 8th you reprint a paper of mine read before the Institute of Mining and Metallurgy, and, as considerable advance has taken place since then in the practice of the process, I should like to point out that the method of cleaning up precipitate suggested by me in that paper is now very much simplified by the use of a special filter press. This enables the contents of the precipitate boxes, after the zinc trays have been withdrawn, to be transferred direct into the filter press, and the washed cakes are ready for fusing direct, or for acid treatment, or roasting, without having once been touched by hand.

The filter press has a lining of ordinary paper over the cloths and the latter do not thus come in contact in any way with the gold precipitate. The cake is lifted out in the frame protected by the filter paper on either side, without transference to any other vessel whatsoever.

The object of my paper was to sound a note of warning as to the heavy loss incurred in running down precipitates by the methods usually followed. The operator in charge of a cyanide plant is not usually in the position to determine his loss for himself, as he can take no risk of any experimental treatment, which would result in his being unable to account for the amount of hullion claimed from him.

On the other hand, it is desired, except where the precipitate is shipped to the smelters, that the hullion recovered should be pure, and thus recourse has been had to the use of niter, dioxide of manganese and other oxidizers without accurate experimental determination of the loss involved by such treatment.

If any cyanider will divide his precipitate into two accurate halves, and run down one-half by the ordinary methods and the second half by reduction with litharge and subsequent cupellation of the lead ingot, he will be surprised at the amount he saves by the lead method above that returned by the ordinary clean-up process.

In a letter to the Johannesburg Mining Standard, in 1899, I pointed out the importance to the industry of saving the large monthly loss resulting from the method of cleaning up employed, and suggested that the powerful corporations there should investigate the matter and determine the standard method of reduction involving the least loss, and this suggestion was also advocated in the editorial on the subject. The suggestion was at that time not acted upon—perhaps, owing to the war—but I do not doubt that within the coming year methods involving acid treatment or oxidation of slimes will be relegated to obscurity there, in favor of some method more closely approximating to the assay of auriferous matter—for instance, fusing with litharge.

London, E. C., Dec. 3, 1902. ALFRED JAMES.

The comment made on the letter of Mr. James to

the South African Mining Journal, April 8, 1899, was as follows:

The attention of cyanide workers is drawn to an important letter from Mr. Alfred James upon the serious loss resulting to the Witwatersrand mining industry in cleaning up the gold from the cyanide treatment. When such loss is estimated by Mr. James himself to run from about 1% to 6% of the whole output from this source, and when a practical and responsible metallurgist on these fields (Mr. Leonard Holms of the Consolidated Gold Fields) fixes the average loss of some 6%, when also a loss of merely 1% is equivalent to a yearly £50,000, increasing proportionately with the output, it is very clear that the suggestion conveyed in the letter—that an organized inquiry be made by the leaders of the industry in the shape of a series of tests on actual working scale—is of the utmost moment.

How and Why the Injector Works.

E. A. Rhodes, in the Practical Engineer, writes entertainingly of the injector. He says: The operation of the injector does not involve any principle of a perpetual motion, and is not doing work without consumption of power. Mr. Forney, in his book, "Catechism of the Locomotive," states the principle in substantially these words: Steam escaping from under pressure has a much higher velocity than water would have under the same pressure and condition. The escaping steam from the receiving tube unites with the feed water in the combining tube and gives to this water a velocity greater than it would have if escaping directly from the water space in the boiler. The power of this water to enter the hoiler comes from its weight moving at the velocity acquired from the steam, and it is thus enabled to overcome the hoiler pressure.

He then goes on to illustrate this by the example of a wooden croquet ball, which will float on the surface of the water, but if thrown violently into the water it will sink before its buoyancy will overcome its momentum, while a very light hollow ball will not sink, no matter how much force we may expend in throwing it into the water, because its momentum or actual energy is much less than is that of a solid ball. If steam were not condensed it would not have sufficient energy to overcome the hoiler pressure.

Another writer, Sinclair, describes the principle very nicely in the following language:

The principle of the injector's action is that of induced currents. A current of any kind has a tendency to induce a movement in the same direction of any body it passes over or touches. Thus we are all familiar with the fact that a current of air (called wind) passing over the surface of a body sets waves into motion.

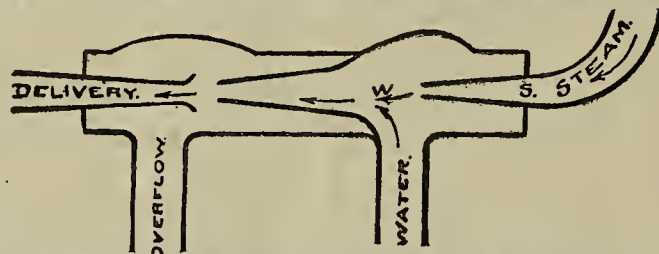
In the same way a jet of steam moving rapidly when injected into a body of water, under favorable conditions, imparts a portion of its motion and starts momentum sufficient to overcome the original pressure of the steam. That is how the injector is made to force water into a hoiler against the same pressure the steam is starting from. There are many other applications of this principle, the most common of which are the ordinary locomotive blast, blowers, steam siphon, steam jets, jet exhausters and Argand burners.

Closely examined, its mystery as a source of power disappears; for it is found that an amount of heat equal to the mechanical equivalent work done is used up during the operation of feeding.

Thus, when a given quantity of heat units pass from the throttle to work the injector, the whole of the heat does not return to the hoiler along with the feed water, as was at first supposed to be the case, but a portion of the heat representing the foot pounds of work done is dissipated, besides other losses due to leakage, radiation and connection.

There are many forms of injectors in use, but all of them conform to the above elementary principles in their mode of action.

In the cut steam enters from the hoiler, passes through the steam pipe and receiving tube, S, at a high velocity, and, combining with the water at point W, condenses, but imparts considerable momentum



to the water which rushes along into the delivery pipe, raises the check valve and passes into the boiler. As the current of water for starting the injector could not be induced against the constant pressure on the check valve, which equals the pressure at the throttle, an overflow is provided, when the water can flow unchecked until the necessary momentum is obtained, when the overflow is closed.

Mine Timbering in the Old Ironsides and Knob Hill Mines.

NUMBER II—CONCLUDED.

By H. P. DE PENCIER, McGill University, Montreal.

One-inch manila rope is used on the drum, with a single-pulley block fastened to the timber of the upper floor; the end of the rope is fitted with a pair of steel hooks for hoisting caps and posts; lagging is tied together and hoisted in lots.

Timber is moved about the upper floors by means of a pair of steel tongs like ice tongs.

As yet no reinforcing sets have been used. Heavy ground is held by putting in diagonal braces, or by extra spragging and cribbing with solid timber cribs built in between the rock and the regular sets to prevent a fall beginning.

In the center of the large stopes cribs filled with waste rock or in some cases with ore are carried from the bottom level up with the timber; this is intended to steady the timbering in the stope. This filling timber is usually 15 or 20 feet square and is retained by large lagging split and placed behind the posts.

Where a turntable is put in the track in the bottoms of stopes a post is left out at opposite corners to allow of long timbers being turned; an 8x8-inch upright is bedded on rock beside the adjacent posts and a 12-inch square timber on top of these supports the regular caps.

On the bottom of the stopes chutes for drawing the ore from the floor above to the mine cars are built in every 15 or 20 feet along the tracks; they are built of 6-inch plank, the mouth is 5 feet above the track and 26 inches wide.

Very little timber is used in drifts and crosscuts, only a few square tunnel sets resting on sills and measuring 4x7½ feet are used.

In winzes and raises stulls are placed across in the usual way to support the platforms and ladders. Ladders are 10 feet long, sides 3x4 inches, rungs 4x1½ inches, 18 inches long and 8 inches apart.

From an underground station in the Knob Hill a vertical shaft over 200 feet deep has been sunk. The frame is made of 8x8-inch round timber; the posts of the gallows-frame are 12-inch square timber; no braces are required, as the tops rest against the rock. The station is lagged with 2x12-inch plank. The foundations are mudsills, with two long sills beneath the hoist. The chamber is dry, and no better roof is required.

A small car is used, running on a 30-inch gauge track, and a small hoist run by air pulls it up the incline, when at the proper place it dumps its load automatically into the movable chute below, which throws it into the railway car standing alongside. The whole hoist rests on mudsills, and can be turned to face different parts of the bank from which the ore is being taken. It is steadied by guy ropes reaching from the top to any convenient anchor.

On the whole, very little timber is used on Knob Hill, a few tunnel sets being practically all, outside of winzes, chutes and underground station. The tunnel sets are 10 feet wide by 7½ feet deep, California sets.

Timber used in Knob Hill may be used repeatedly until worn out; but the life of timber in Old Ironsides is not expected to be more than three or four years, on account of the water and great quantities of powder smoke.

A timber crew in the Old Ironsides consists of four men, of whom two at least should be experienced men, the others may be laborers; but more expeditious work can be done if they also have had some experience. The speed of erecting stope timbers depends on the location and the condition of the place where they are being put up, if far from the timber stores or near, and whether there is much rock in the way or not. Generally, from six to twelve square sets of three pieces are put up by each crew in eight hours.

Tools required by each crew consist of two sharp axes, two older axes, 6-foot crosscut saw, hooks, crowbars, hammers, picks, shovel, spirit level, straight edge, and a few drills, besides tools used about hoisting engine.

The framing carpenters on the surface require cant-hooks, 8-foot crosscut saws, handsaws, adzes, axes, squares, templates, straight edges, plumb bobs, chalk lines, grindstone and whetstone. As a rule, the underground tools are sent to the surface to be sharpened.

The regular timbermen get \$3.50 for eight hours shift, laborers \$3; and the foreman who looks after the crews gets \$4. The framing carpenters get \$4 per day, but work ten hours per day.

Figures of the cost of mining have not been made public. Any attempt to figure the cost of timbering in a mine must be made from figures got during a period when the conditions have been very nearly the same; as this has not been the case here, owing to changes in the labor and in the source from which the timber has been got, the figures would be of little use.

The drawings of timber were made by the writer from measurements and notes taken by him at the mine.

Electric Storage Battery Locomotives.

The electric storage battery locomotive is an efficient and convenient agent in the economical banding of material about industrial plants.

There is not a manufacturing plant, but what could with profit seriously consider the question of the eco-

and what saving could be effected by the adoption of modern methods. For years about many industrial plants material has been moved from one department to another by means of wheelbarrows and trucks, but as new buildings have been added to the plants from time to time, and the area over which the buildings extend has been increased, the handling or moving problem has not in most industries been given the attention it deserves.

The Jeffrey Manufacturing Co. of Columbus, Ohio, claim they were the pioneers in the building of storage battery locomotives. For a number of years this company had been building electric locomotives operated from trolley wire and third rail for use in and about mines, and their attention was first called to the desirability of bringing out a small storage battery locomotive which could be readily operated in coal mines for the placing of empty cars at the face in the rooms and hauling out from such rooms loaded cars. It was impractical, due to expense and inconvenience, to carry trolley wires into the rooms in the mines, so they started a line of experiments looking towards an economical and efficient storage battery locomotive for this work with success.

Perhaps the most interesting locomotive shown in the illustrations is the one which is being used about the plant of the Jeffrey Manufacturing Co. at Columbus, Ohio (Fig. 1). The weight of this locomotive is about twelve tons. It is equipped with two trucks, each having four drivers driven through flexible connections by one motor. The battery is arranged in two sections, each being supported on a truck. A cab for the operator is provided, and in this are located all necessary instruments, switches, controllers, etc., both for charging the battery and operating the motor. The first of these locomotives to be built and put in use by the Jeffrey Manufacturing Co. has been in constant service about their plant for over two years, and the expense of the operation and maintenance, they say, has been practically nil.

Some of the accompanying illustrations show the storage battery locomotive with trolley attachment. It has been so built in order that, where it is convenient, a trolley line can be strung along a portion of the track over which the locomotive operates so that the latter may be charged while running over such section. Other methods for charging have been devised, such as arranging for regular charging stations where it would be convenient to locate charging plugs; also so that one battery can be quickly removed from the locomotive and a freshly charged one put in its place.

Fig. 2 illustrates an electric storage battery locomotive used in gathering coal from rooms in mines. The cut shows the engine being charged. Figs. 3 and 4 show storage battery locomotives used at the De Lamar copper refining works, and Fig. 5 illustrates a twelve-ton storage battery locomotive hauling train of cars in the Jeffrey Manufacturing Co.'s plant.

Useful Notes for Electrical Engineers.

A little handbook recently issued by the National Boiler & General Insurance Company, Limited, London, gives the following useful notes for electrical engineers: Maximum permissible temperature of dynamo and motor coils, 150 degrees to 160 degrees Fahrenheit; watts = volts × amperes; 1 watt = 441 foot-pounds per minute; 746 watts = 1 horse power; 1,000 watts = 1 kilowatt; 1 horse power = 0.746 kilowatt; 1 kilowatt = 1.34 horse power; 1 Board of Trade unit = 1 kilowatt for 1 hour; 9 to 10 sixteen-candle power lamps require 1 horse power; 1 sixteen-candle lamp at 100 volts takes 0.48 to 0.6 ampere; efficiency of small dynamos, about 85%; efficiency of large dynamos, about 93%; efficiency of steam dynamo sets, 70 to 75%; 1 kilowatt requires from 1½ indicated horse power to 2 indicated horse power to generate it. Keep damp, dust and oil off wiring and insulation. Electric driving is often suitable for scattered or intermittently loaded machinery.—*Electrical Review.*

THE paternal nature of the Mexican Government is evidenced in the fact that native Mexican miners employed by Americans in Mexico often receive far less than Americans or other foreign miners, though when educated to it the Mexican miner is not vastly deficient. The Mexican miner's wages are fixed in certain cases by the Government, as at Cananea, where foreign miners receive double the wages paid natives. The idea of this appears to be in the event of the fact becoming known that high wages prevailed, Mexican miners would go there in great numbers, to the disadvantage of other mining sections of the republic and Cananea would be overstocked with labor.

MECHANICAL draft for the boiler equipment of the St. Louis Exposition power plant will have the unusual feature of combining forced draft and induced draft. The plant will comprise twenty-six boilers of 200 H. P. each. There will be four forced draft fans of the full housing type and 160 inches in diameter. After the gases pass through the boilers they will enter two induced draft fans, 230 inches, or over 19 feet in diameter.

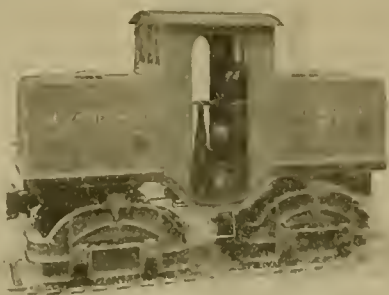


FIG. 1.

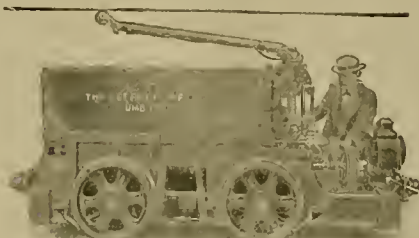


FIG. 2.

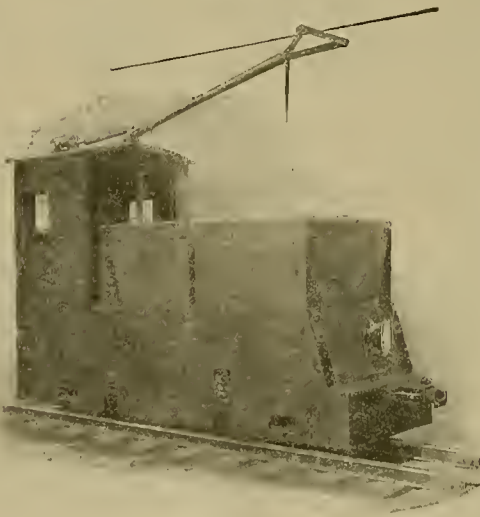


FIG. 3.

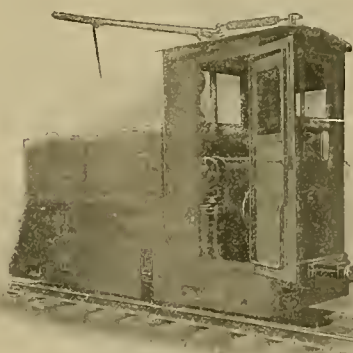


FIG. 4.



FIG. 5.

nomical moving of raw and finished material from one building or department to another. Unfortunately there has not been sufficient attention given to this item of expense, and it would undoubtedly surprise many managers of industrial plants if they actually knew what percentage of the cost of manufacturing material was chargeable to this unproductive labor

"King Solomon's Mines;" or, The Land of Ophir.

Written for the MINING AND SCIENTIFIC PRESS by WILLIS G. DODD.

I note in a recent dispatch that "Dr. Carl Peters, the resolute little explorer, has returned to London from East Africa with new proofs of a theory that is of great popular interest, for it directly concerns the Bible, the theory referred to being that the district between the Zambezi and Sabi, stretching from the Indian ocean almost as far back as Bechuanaland, including a part of Portuguese East Africa and most of Rhodesia, was King Solomon's Klondike, or the land of Ophir; and the doctor has pieced out, step by step, this wonderful story in a manner that would do credit to Sherlock Holmes."

The Chinese have a proverb which says, "Gold can make a blind man see," and it is not impossible that Dr. Carl's East African interests may have influenced his discoveries.

King Solomon's mines, or the geological location of the land of Ophir, is an interesting subject to mining engineers, regarding which in recent years there has been much speculation. All that is positively known concerning the land of Ophir is to be found in the Bible, particularly in that portion descriptive of the preparation for and the building of that magnificent temple by Solomon which was erected to God and dedicated to His Holy Name.

The first mention of the land of Ophir is to be found in the Biblical account of the division of the then known lands of the earth, among the descendants of Noah, in which account we are told that the sons of Jektan, among whom were Sheba and Ophir, had their dwelling place "from Mesha as thou goest unto Sephar, a mount of the East." (Gen. X-XI.)

This allusion to a point of the compass was made with regard to some well-known locality or established central point or landmark, and as this division of the land took place during the later years of Noah's life, the landmark referred to was without doubt Mount Ararat, upon which the ark rested after the flood, Lat. 39 N., Long. 44 E. The land of Ophir, therefore, must have been located somewhere between the 35th and 45th parallels of N. Lat. and to the eastward of Mount Ararat.

In this connection it may not be out of place to say that it is very probable the term "Ophir" in King Solomon's day was used in much the same sense as we to-day use the term "Orient;" however this may be, the Bible furnishes us with sufficient data from which the mines of Ophir may be located with reasonable certainty.

For the purpose of obtaining gold and other material with which to garnish and decorate the temple, King Solomon built a fleet of ships at the port of Ezion-geber, close to Eloth on the Red sea. Hiram, king of Tyre, furnished to Solomon servants and shipmen who had knowledge of the seas, to accompany the servants of Solomon in these ships to fetch gold from Ophir. Three years were consumed in making the round voyage, and "they came to Ophir and fetched from thence gold, four hundred and twenty talents (\$27,533,000), and brought it to King Solomon, with a great plenty of algar trees (camphor wood), precious stones, ivory, and apes and peacocks." This account does not give the exact sailing course of this fleet, but from the cargo brought back it is not difficult to trace it.

Ceylon and Burmah have in all ages been noted for their precious stones; India for its sacred apes; Siam for its ivory; China the home of the peacock; Formosa and Japan for algar trees or camphor wood; and for gold the Manchurian peninsula, known as Korea, or the home of the hermit nation, situated to the northeast of China between Lat. 34° and 43° N. and Long. 130° E.

Additional evidence is furnished as to this sailing course. In the narrated account of the visit of the queen of Sheba to Solomon, she came to Jerusalem with a great train, with camels that bear spices, etc., and when she departed there came no more such abundance of spices as those which the queen of Sheba gave to King Solomon. Have not Persia and Arabia from the earliest times been famous for their fragrant spices? The land of Sheba was undoubtedly located in Arabia or Persia.

The distance from the port of Ezion-geber on the Red sea to the Korean peninsula, as coursed by the steam liners of to-day, is 11,000 miles, and assuming that the seaworthiness and sailing qualities of the ships built by Solomon were little, if any, better than the Chinese junks of the present, they would of necessity follow the coast line, which would increase the distance to 13,000 miles, and allowing two seasons for mining operations, which were made necessary in order to take advantage of the favorable monsoons, and the delays incident to prevailing typhoons, fully three years would be consumed in making a round voyage.

This expedition to the land of Ophir for the purpose of obtaining gold and other material for the House of the Most High was a sacred one, dedicated to the service of the temple,

and the personnel of those detailed to accompany it were selected from among the Levites and from that particular division whose appointed duties were those connected with the treasures of the House of God and treasures of dedicated things, as numbered and minutely specified by David before his death. (I Chr. XXVI.) "For they departed not from the commandment of the king unto the priests and Levites concerning any matter, or concerning the treasures, for so had David, the man of God, commanded." (II Chr. VIII, 14-15). Shehuel, "the son of Gershom, the son of Moses," was ruler of the treasures, and Ahijah was "over" (custodian of) the treasures of the House of God and over the treasures of dedicated things.

The Levites who were consecrated to the service of the temple were numbered, and their number, man by man, was thirty and eight thousand, divided into four divisions. Four thousand were to praise the Lord with instruments. Six thousand were officers and judges. Twenty and four thousand were to set forward the work of the House of the Lord. Four thousand were porters (guardians) from the sons of Merari and from the sons of Kore. This division was known as the Korhites; they were the guardians of the temple, its treasures and the gates. (I Chr. XXVI.)

Therefore, under a strict observance of the commands of David, "from which they departed not in anything," the personnel of the expedition to Ophir must have consisted of Ahijah in command with a detachment of Korhites and the miners and sailors furnished by Hiram, nor is evidence lacking in support of this.

How many voyages were made from Ezion-geber to Ophir is not known—certainly more than one—for "all King Solomon's drinking vessels were of gold, and all the vessels of the forest of Lebanon were of pure gold; none were of silver; it was nothing accounted of in the days of Solomon." (II Chr. IX.) But the search for gold in those days was no less hazardous than it has ever been, and the expedition to Ophir ultimately came to grief—disaster overtook them.

On a beautiful wooded hill, just outside the walls of the ancient and picturesque city of Ping-yang, situated on the left bank of the Tai-dong river, about 80 miles from its mouth, can be seen, in a fine state of preservation, the tomb of Ahijah (Korean pronunciation Kejab), the reputed founder of the Korean empire.

At the foot of the hill, by the side of the imperial road, stands a monument recording that Ahijah, whose grave is near, founded the Korean dynasty, hearing a date corresponding to a period of time between the tenth and eleventh centuries B. C. (or about the date of the building of Solomon's temple), and warns all that this is holy ground and to take heed in passing so sacred a place.

The monument marking the tomb or grave of Ahijah is in the form of an altar, consisting of a large, heavy slab of close-grained granite, accurately squared and approximating five tons in weight, and is supported upon four finely chiseled pedestals, representing copper treasure chests, showing the rivets by which the heads of the chests were fastened, and also the ring handles by which the chests were carried or slung. These pedestals rest upon a substantial stone foundation of unknown depth.

At the head of the grave or tomb, facing the east, stands, carved in close-grained granite, the figure of Ahijah, clad in the vestments and holding in his hand the symbolic key of his office, and on either side, roughly carved in granite, are the two rams of sacrifice. (Ex. XXIX.)

During an invasion of Korea by the Japanese some 300 years ago, the head of one of the rams was broken off by the invaders, and the attempt made at repairing the damage was not all that could have been desired, but undertakes to show what it once was.*

Ahijah's tomb has always been held in great veneration by the Koreans, and from the most ancient times has received constant care and attention from the priests of the temple near by.

The Korean peninsula is about 600 miles long and has an average width of about 135 miles from east to west, giving an area of approximately 81,000 square miles. It is divided from Russian territory by the Yalu and Amnok rivers, and as a whole, is decidedly a mountainous country, but possesses innumerable valleys and foothills, well watered and under a high state of cultivation. The west coast is fringed with one of the most beautiful archipelagoes known, many of the islands being thickly populated and well cultivated. There are few good harbors and only one or two navigable rivers, and these for only a short distance from their mouths.

The geological formation of Korea is simple; it abounds in mineral wealth, which is undeveloped. The climate is the best and healthiest to be found in the Orient, Europeans being entirely free from climatic maladies that seem to prevail in other parts. The summers are temperate; winters quite cold. Average rainfall about 40 inches, one-half of which falls during the months of July and August, rendering travel during this period very difficult.

The population of Korea is variously estimated

from 12,000,000 to 15,000,000; capital, Seoul, 150,000; second city of importance, Ping-yang, 60,000. The government is practically a despotic monarchy. They have no national religion; spirit worship and Shamanism prevail, though the teachings of Confucius are generally accepted as the rule of morality. The Korean, however, when once converted to Christianity, shows clear comprehension and clings to its teachings with great fidelity.

In Korea bondage is practiced, though the lot of the hondsman is not a harsh one, as he may purchase his freedom. The origin of this system of bondage is unknown and is peculiar to the Koreans; not found elsewhere in the Orient.

The Korean language is entirely different from that of the Chinese or Japanese, and has the distinction of being the only Oriental language possessing an alphabet.

The industries of Korea may be said to be principally agriculture and mining. Wheat, barley, rice, millet, beans, potatoes and all kinds of vegetables are grown. Horses, pigs and fine cattle are raised, a few sheep—these are not, however, for the purpose of food and wool, but expressly for royal sacrifice, a singular custom, not found elsewhere in the Orient.

All the mines belong to the king, but gold mining, both alluvial and quartz, is carried on throughout the peninsula under a tribute system. The Korean is the miner of the Orient; at placer mining he is an expert; in quartz he performs wonders, considering the facilities he has at his command. At water level he has to stop; so that the gold quartz mines of Korea, and they are many, are really undeveloped—merely prospected.

The Koreans are a handsome race, possessing a good physique; average height, about 5 feet 6 inches; fine features, some almost patrician; hair, russet brown to black; eyes, hazel to dark brown; noses, straight, many instances aquiline; mouth, well formed, many with mustache and full beard; complexion, dark olive to light brunette; quick and intelligent, and, when given an opportunity, progress rapidly in the ways of the Occidental.

They have no history; from whence they came or when they emigrated even tradition is silent. Chinese and Japanese history records various invasions of Korea, but furnishes little or no reliable information regarding the country; and it has only been since the treaties of 1883, which opened up the "Hermit Nation," that the world has had an opportunity to study this peculiar and interesting people.

Space will not permit, at the present time, of an extended analysis of this exclusive nation, but it is certain that the Koreans, with their general characteristics of feature, complexion, language, alphabet and peculiar customs, never filtered through the Tartar or Chinese races. There is every reason to believe that they are of Semitic origin; that they are, in fact, descendants of the sons of Kore, from whom the country takes its name.

Mining concessions have recently been granted to Americans who are operating on quite an extensive scale and with the most modern appliances, the returns from which indicate that the ancient Ophir is still a land of gold. Steam and electric railroads are being built. Noble men and women, graduates from some of our best medical colleges, are working in the missionary field with most gratifying results, and it seems safe to predict that, at no distant future, this long lost land of Tarshish will take its place as one of the progressive nations of the Orient.

Geology of Southern Nevada and California.

Bulletin No. 208, United States Geological Survey, now in press, is the "Descriptive Geology of Nevada South of the Fortieth Parallel and Adjacent Portions of California," by J. E. Spurr. The route of investigation lay back and forth across Nevada three times, then passing into California by way of the Pahrump valley, it continued through Death valley, over the Panamint range, across the Mohave desert, and ended at San Bernardino. The trip lasted about five months, and comprised over 2,000 miles of actual travel.

The primary object of the expedition was to make a rough general geologic map of the western United States. In order to accomplish the style of mapping desired with due economy of time and labor, the journey was carefully planned so as to avoid any duplication of routes already traveled by geologists. The area to be investigated was bounded on the north by the geologic maps of the Fortieth Parallel Survey, on the east by the geologic maps of the Wheeler Survey, and on the west chiefly by the Turner reconnaissance map of the Sierra Nevada. On the south there were no boundaries.

Mr. Spurr discusses elaborately and in succession the mountain ranges of east central Nevada, of west central Nevada, of southern Nevada, and the Great Basin ranges of California, north of Mohave desert. He notes in passing the ore deposits of the various sections of Nevada and of California which were traversed, and he occasionally comments on the possible origin of these deposits. The bulletin is accompanied by maps.

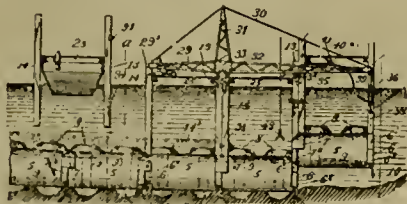
*See illustration on page 383.

Mining and Metallurgical Patents.

Patents Issued December 16, 1902.

Specially Reported and Illustrated for the MINING AND SCIENTIFIC PRESS.

METHOD OF CONSTRUCTING AND LAYING SUBAQUEOUS TUNNELS.—No. 715,768; H. F. Dunham, New York, N. Y.



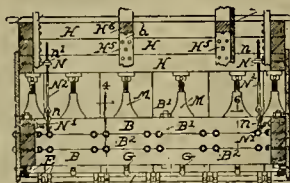
The method of laying subaqueous tunnels, consisting in erecting support upon section, laying section, erecting support upon second section, lowering second section means first and second supports, erecting support upon third section, lowering third section means of third support and one or more of contiguous supports, thus continuing until sections are all laid.

CAM.—No. 715,830; V. W. Mason, Jr., New York, N. Y.



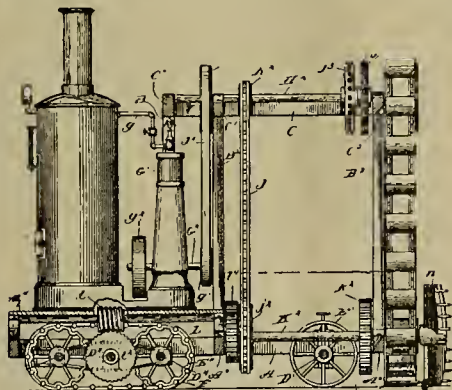
A cam composed of body and removable engaging face connected thereto composed of plate having rib at each side and ears provided with perforated plugs, and bolts connecting removable face with body which pass through plugs.

APPARATUS FOR SINKING SHAFTS.—No. 715,834; P. G. Moran, Springfield, Ill.



A shield for apparatus for sinking shafts, consisting of shield-pieces pierced by holes, timbers having holes halved in timbers registering with holes in shield-pieces, bolts fitting in holes in timbers and shield-pieces and connecting them with each other; in combination with timber-work on which shield is slidable and means for forcing shield downward.

EXCAVATING APPARATUS.—No. 715,962; R. Bowker, Kokomo, Ind.



In portable excavating apparatus, combination with rotary means for breaking up earth, means for removing broken earth, means for continuously propelling apparatus at speed proportionate to work of removing earth.

TREATMENT OF ZINC ORES.—No. 715,771; F. Ellershausen and R. W. Western, London, England.

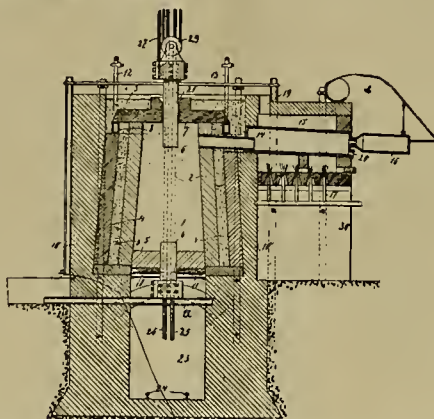
A process for treatment zinc ores and other zinciferous matter containing cadmium, consisting in reacting upon same with hydric ammoniac sulphate, washing with ammonium sulphate and treating liquor with zinc in finely divided condition, for separation of cadmium.

ROCK DRILL.—No. 715,993; F. Coyle, Graniteville, Vt.



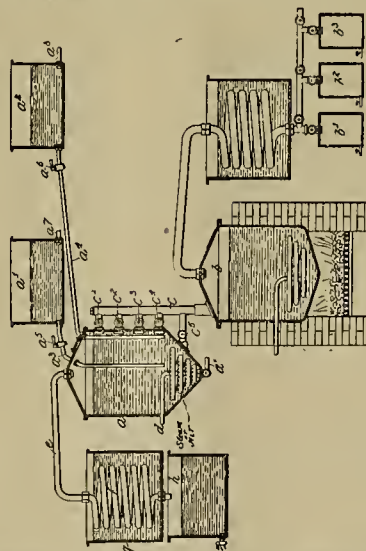
Combination with piston, of chuck, means for loosely connecting chuck to piston to permit of rotary movement of one with respect to other, means carried by chuck for fixedly clamping tool in position, gib, and screw for actuating gib and locking chuck to piston.

WORKING ZINC AND SUBSTANCES CONTAINING SILICIC ACID IN ELECTRIC FURNACES.—No. 716,008; A. Dorse-magen, Wesel, Germany.



Method of working zinc-silicate ore consisting in preparing charge of zinc silicate and carbon, subjecting charge to action of electric current sufficient to determine reduction and volatilization of zinc and formation of carbid silicon, suitably condensing products of reduction and volatilization.

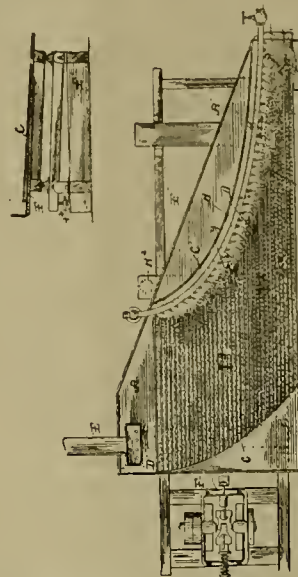
METHOD OF TREATING MINERAL OILS OR THE DISTILLATES OR RESIDUALS THEREOF.—No. 716,132; J. S. Stewart-Wallace, Knock, Ireland, and W. B. Cowell, London, England.



A method of treating mineral oils consisting in placing them together with 10% water in vessel separate from but connected with still by means of pipe furnished with valve-controlled conduits communicating with vessel at different levels, heating contents of vessel to temperature 180° to 212° F., supplying to vessel from tanks solutions caustic soda and permanganate potash and alumina sulphate heated to temperature 180° to 212° F., and in proportions 1% caustic soda, .5% permanganate of potash, injecting steam into mixture for agitating and maintaining temperature of same at 180° to 212° F., collecting and condensing desired light oils that may be present in mixture and driven off during heating, allowing mixture settle in order that impurities may separate therefrom, drawing off such impurities from lower portion of vessel, permitting remaining portion of treated mixture to flow from vessel to still by suc-

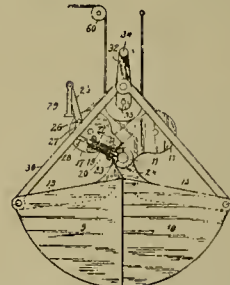
cessively opening aforesaid cocks, commencing with uppermost one thereof, finally collecting distillates.

ORE-CONCENTRATING TABLE.—No. 716,205; W. G. Dodd, San Francisco, Cal.



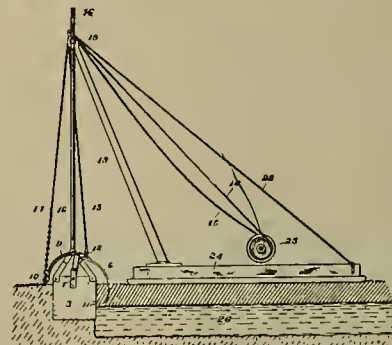
A concentrating table provided with means for imparting thereto longitudinal and transverse inclination, working surface of table being provided with number of riffles extending longitudinally from overflow-riffle toward its foot, terminals of riffles successively advancing and terminating upon surface of table in curve line, approximating inverted parabola, smooth or unriffled surface to table onto which material collected by riffle is cleaned and separated by being subjected to action of clear water, means for imparting reciprocating motion to table, devices for giving thereto longitudinal and lateral inclination, and means whereby water is admitted onto table for washing material delivered onto unriffled portion thereof.

HOISTING BUCKET.—No. 716,239; O. Johnson and J. Johnson, Milwaukee, Wis.



In hoisting bucket having two bucket segments connected together by pivot shaft, sleeves surrounding shaft and by means of arms connected to segments, head, links connecting head to segments, plurality of sheaves carried by head, arm on each sleeve, sheave carried by each arm, hoisting line passing about sheaves, locking agent comprising means carried by one of sleeves for coacting with means carried by other sleeve to automatically lock bucket in open position, and releasing member operatively connected to agent for contacting with material to be hoisted to unlock bucket and allow same to move to closed position.

EXCAVATING APPARATUS.—No. 716,246; A. Klatt, Collinsville, Cal.



In excavating apparatus, bucket open at bottom and one side, pivoted arm near top, curved scoop mounted on arm, adapted to close bottom and open side, lifting means secured to scoop for opening same, and closing means, consisting of lever arm whose fulcrum is pivot of pivoted arm, and whose outer extremity is on opposite side of pivot from scoop.

Mining Summary.

Specially compiled and reported for the
MINING AND SCIENTIFIC PRESS.

ALASKA.

Last summer the United States Geological Survey had five parties in the field—two in the Copper River basin, in south-central Alaska, through which it has been proposed to build a railroad from Valdez on the Yukon river. One party under F. C. Schrader, geologist, D. C. Witherspoon, topographer, mapped the upper Copper River basin and adjacent portions of the Tanana River basin. By this, previous surveys were joined. The second party, under T. C. Gardine, topographer, and W. C. Mendenhall, geologist, mapped the Chistochina gold fields and studied the southern copper belt. Additional knowledge was gained regarding copper north and south of the Wrangell group, and geographic data collected concerning the rugged and little known Wrangell mountains. The third party, under A. H. Brooks, in general charge of the Alaskan work of the Survey, and D. L. Reahurn, topographer, with a party, started from the head of Cook inlet and proceeded in a northerly direction to Tanana river. From this point they crossed to Rampart City, on the Yukon. A fourth party, under A. J. Collier, geologist, studied the coal resources of the Yukon valley in United States territory, adjacent to the river. They also visited placer camps not before investigated. The fifth party, with W. J. Peters, topographer, mapped the southeastern parts of the territory near Juneau.

The mill on the Engineer mine, near Skagway, is partly up and two shifts are sinking the shaft. The hoist is in position.

ARIZONA.

COCHISE COUNTY.

The new machinery for the Benson smelter has been shipped from San Francisco, Cal.

A strike is reported in the Pavo Rico, owned by the Atlas Ex. & M. Co. It is a 2-inch streak that assays 1500 ounces silver and 15% copper.

The main drift in the Modern mine, near Bisbee, is in 165 feet from the shaft. The water is hoisted by a bailing skip.

The Miner says over 200 men are doing assessment within a radius of 10 miles of Bisbee. In many cases old shafts are being sunk deeper instead of new holes started, and in some of them good ore has been found by the increase in depth.

The Miner says at the Gaston & Shihley one shaft is down 40 feet in ore. Owing to the lack of hoisting machinery a new shaft has been started east of the former. It lies between the Easter Sunday and the Copper Glance. Superintendent Wagner, Copper Glance M. Co., has put in a truck and two 125-gallon tanks to handle the water in the two-compartment shaft at 505 feet. Sinking has been resumed. A drift south from this shaft at 500 feet is in 40 feet.

The Miner says last week there were 100 men at work in and around Solomon Springs, the Easter Sunday and the Copper Glance on assessment work.

COCONINO COUNTY.

At Williams the smelter of the Anita Con. Copper Co. is completed.

GILA COUNTY.

The United Globe mine will again hoist water with bailing tanks until a new pump can be gotten.

R. M. Force, president of the Arizona Colorado C. B. & G. M. & M. Co., will go to Denver to attend the annual meeting of his company, on Jan. 6, when a new steam hoist and the sinking of a double-compartment shaft will be considered.

A. C. Slesoth, superintendent of the Lake Superior & Arizona M. Co., on Queen creek, near Globe, says the air compressor, Leyner drills and other machinery have been installed and thirty-five men are working.

After two weeks the Old Dominion C. Co., at Globe, has gained control of the water in its working shaft. The big pump on the tenth level raises 500 gallons a minute beside the smaller pumps and bailing tanks. There is another large pump on the twelfth level, which when it is reached will make the control of the water easy. The smelter has been closed on account of a scarcity of fuel oil.

F. P. Hofschulte is developing claims in the Mazatzals, the ore carrying good values in copper and silver. He has 400 feet of work, and will run a tunnel 150 feet.

GRAHAM COUNTY.

Superintendent Braden is pushing work on the Black Rock M. & M. Co. proper-

ties southwest of Fort Thomas. A shaft will be sunk 200 feet.

MOHAVE COUNTY.

Experiments are being made by W. Heimrod on tailings at the Mineral Park mill at Mineral Park. There are several thousand tons of material which will require a large plant.

B. Hastings, superintendent of the Ramrod mines, near Kingman, will build a mill at the mines.

The Yucca Cyanide M. & M. Co. at Cedar Valley is drifting on the lower level in ore.

PIMA COUNTY.

R. Bradford, superintendent of the Copper Hill mines 23 miles from Tucson in the Catalinas, says the cyanide plant will be ready January 10.

PINAL COUNTY.

It is reported that the Pinal Paraffine Oil Co., boring in the Riverside district, has struck oil at 900 feet.

On the Elder-Neiman gold mine, in the Riverside district, the tunnel run to connect with the 300-foot shaft has been completed and has opened up a body of copper carbonates, which also carries gold.

SANTA CRUZ COUNTY.

A strike of ore is reported by the Nogales M. C. Co., near Nogales, in the shaft of the Buena Vista. The assays give 20% copper with silver and gold. This company also owns the Pena Blanca properties. They have ordered concentrators for both mines and propose to also erect a smelter.

YAVAPAI COUNTY.

G. B. Upton, general manager of the Oro Grande Mines Co. of Wickenburg, has gone East to buy a 40 H. P. hoist, air compressor, diamond drill and other machinery for the Oro Grande.

The Courier reports that the Bunker Hill, west of McCahe, has resumed. The Treadwell M. Co. have bought the Boggs & Hackberry mines, near Mayer, and have erected a gallows frame on the Boggs. Douglas, Lacey & Co. have bonded the Casper property at McCahe. This property is on the Jessie lead.

Manager Felt of the McCahe, near Mayer, says the shaft which was partly destroyed by a fire and cave-in is repaired down to the 500 level.

At the Black mine, between the Chicago mill and D. Grubb's properties, Hassayampa district, near Prescott, the shaft is down 180 feet, showing 4 feet of copper and galena. Grading is being done for a steam hoist.

At Douglas, Lacey & Co.'s Hurricane group, near Prescott, a crosscut is being run from the shaft, at 175 feet, to strike the Hard Luck vein 220 feet below the outcrop.

The Courier says the Prescott assay office will put in a stamp mill and cyanide plant. A blue printing and draughting department is being equipped.

At the Iron Queen mine, near Prescott, the grading and retaining walls are finished and the foundation for the 100 ton stamp mill begun. The shaft is down 180 feet and drifts are being run on the 100-foot level.

Superintendent Kent, at the Oriental mill, is putting through thirty tons of ore daily from the Postmaster mine.

The Midnight mine, near Prescott, owned by St. Charles Bros., shipped a carload of ore to the Val Verde smelter last week.

ARKANSAS.

FOLK COUNTY.

A strike of zinc and lead ore has been made at the Davis mines near Mena. The ore was found at 60 feet and the face runs from 4 to 6 feet.

CALIFORNIA.

ALAMEDA COUNTY.

It is reported the Mercantile Oil Co. is negotiating for the purchase of the Campbell Glass Works property in Berkeley, the intention being to use it for an oil refinery.

AMADOR COUNTY.

At the Hoffman, near Jackson, the tunnel being run to tap the ledge is in 300 feet. It is thought the main gouge has been passed by 20 feet, with the tunnel still in slate formation. It will be continued till the greenstone footwall is reached. The object of the tunnel is to ascertain a suitable point to sink a shaft. The point where the tunnel would cut the lode is south of the south face of the drift at the 1400 level of the Argonaut.

Drifts are being run north and south on the 2300-foot level at the South Eureka mine, near Sutter Creek.

At the Kennedy mine, Jackson, 800,000 feet of lumher has been hauled out of 1,000,000 feet required to complete the work on the new mill. The cement foundations for the new hoist are completed.

At Del Monte mines, near Jackson, the superintendent reports total length on

crosscut run in November, two shifts per day, 71 feet, at cost of \$10.06 per foot; distance upraise driven in November, 20 feet, at \$6.44 per foot. Total length of Del Monte tunnel Dec. 1, 155 feet; 30 feet run in November at \$1.32 per foot. Cost of milling during November, including labor, etc., \$140. The mill has been running one shift since Nov. 9th on ore in the hins and ore from the raise. The Del Monte tunnel is expected to crosscut the ledge in another week.

The Gardella mine at Big Bar, near Jackson, has been taken by the company operating the Easy Bird and other properties. D. Black is hauling lumber for necessary buildings. A 2-stamp mill has been in operation on the property for some time with good results to the owner, J. Gardella. The vein is from a few inches to 4 feet wide and carries coarse gold. The county rock is hornblende schist. A dike accompanies the vein. The mine has been worked by tunnels. A winze sunk in the lower tunnel shows 2 feet of ore.

Repairing the shaft at the Zella mine at Jackson is in progress, retimbering from the 400 level to the surface.

The Herald says the water recently struck in the Brunswick mine at the 1200 level is too much for the pumps. To obtain additional power a pipe line will be laid from the South Yuba reservoir, 4700 feet. The line will continue to the Union Hill, the Empire and the North Star mines. The cost of the line is estimated at \$15,000.

CALAVERAS COUNTY.

Near Glencoe the Fanny Marie mill has resumed. The mines of Glencoe have had less attention than their development justifies. The district produces high-grade ores. The veins are mostly in slate, with dike rocks.

A 20-stamp mill is being put up at the Sultana mine near Angels.

W. A. Hildreth, president of the Oriole mine, near Angels, says the 10-stamp mill will soon be ready to run. They have uncovered a vein at the 240-level which has a 42-foot face.

The Mahala mine, owned by S. Redmond and Casey Bros. of San Andreas, situated above Rich Gulch, is reported showing well. The new tunnel is in 400 feet and work begun opening up the lower tunnel.

The Western Mines Co., which has bought the Foote & Thompson mine, near Rich Gulch, have shipped in three carloads of machinery and material; 2500 feet of cast-iron pipe has arrived at the mine, 100,000 feet of lumher has been bought and a six-drill compressor is on the ground.

One hundred and twenty-five men are employed on the ditch and flumes of the Nelson mines at Calaveritas, the work being the widening of 14 miles of ditch and the laying of 1½ miles of 20-inch pipe.

CONTRA COSTA COUNTY.

The Peacock coal mine, 2 miles east of Clayton, has been leased by M. Thomas, who intends to reopen the mine.

EL DORADO COUNTY.

Operations at the California-Bangor slate quarry, Kelsey, were resumed last week under the new ownership.

Articles of incorporation of the Larkin M. Co. have been filed with the county clerk at Placerville, also by the Pyramid Power Co., principal place of business San Francisco.

The Horseshoe M. Co., of Newtown, put in a 6-inch plunger pump last week.

The Montezuma mine at Nashville is to use oil as fuel. The railroad company will deliver the oil at the depot at El Dorado. A 500-gallon tank wagon will convey the oil to the mine.

KERN COUNTY.

(Special Correspondence).—The 30-stamp mill of the Yellow Aster Co. at Randsburg started on the 15th inst, after an idleness of several months owing to inability to obtain sufficient water by pumping from Goler well, which is 450 feet deep. A system of bucket hoists have replaced the pumps in the well and is working satisfactorily, supplying water for both mills. One hundred and thirty stamps are now running.

Randsburg, Cal., Dec. 23.

The Union Oil Co., of Los Angeles, has completed a reservoir in the Kern river field 250 feet square and 27 feet deep, concrete lined, having a capacity of 20,000 barrels. The Standard is building three reservoirs of equal size in the same field.

It is reported Salt Lake men have bought the Kern Crown Oil Co.'s properties at Midway, and have organized the Utah-Midway Oil Co.

MARIPOSA COUNTY.

At the Bonnett mine at Whitlock the ore is crushed in an arastra, and the tailings are discharged under a series of plates. A shaft house, 40x44 feet, has been built on the Imperial and work in the shaft

begun. An 18-inch vein has been opened up.

MONO COUNTY.

It is reported at Reno that C. D. Lane of Angels, Cal. offered Wedekind & Blackburn \$200,000 for the Golden Gate mine in Antelope valley, which was refused. C. L. Hays on his claim adjoining the Golden Gate has cut a 6-foot vein of pay ore.

NEVADA COUNTY.

Superintendent C. C. Weisenberger is putting up a hoisting works at the Buckeye mine, near Grass Valley.

The directors of the South Idaho M. Co. at Grass Valley are considering the purchasing of machinery. Preparations for putting it in are being made.

Pumping is resumed at the W. Y. O. D. mine at Grass Valley, after a month's idleness due to breaking a shaft. During the hang-up the concrete foundations were found to be out of plumb, and after removing the machinery the concrete was blasted out and replaced with new.

The Pennsylvania Co. expects to have the mine unwatered in another week.

PLACER COUNTY.

G. and L. Pease are preparing to mine under permit by the hydraulic process at Yankee Jims, near Colfax. Their tailings will be impounded in Devil's canyon.

The new 10-stamp mill at Black canyon mine, Westville, was started last week.

It is reported the Rising Sun mine, near Colfax, will be reopened. Electric power will be used.

PLUMAS COUNTY.

At the Ohio and Summit mine, Genesee valley, a tunnel to tap the gravel channel is in 50 feet.

SACRAMENTO COUNTY.

It is reported the mine of the Sacramento & Rescue M. Co., on the ranch of Mrs. Hoke, near Mormon Island, has been yielding \$5 a pan.

SAN BENITO COUNTY.

The Hollister Bee says the Cerro Bonito quicksilver mine near Panoche, which has been idle for twenty-five years, will be reopened by the Cerro Bonito M. Co. They will begin operations with forty men.

SANTA BARBARA COUNTY.

The Pinal Oil Co. is pumping oil and drilling has begun for well No. 2. The Brookshire Co., owning adjoining land, will put down a well.

SHASTA COUNTY.

A strike is reported made in the Blue Jay mine in Old Diggings district, near Keswick. The Blue Jay is owned by Sutton & Leaming, who have been doing development work on the property. The ledge, a foot in width, contains copper ore and was tapped at 60 feet by a 100-foot tunnel, and assays show both gold and copper. The property is near the Keswick smelters.

General-Manager L. T. Wright of the Mountain C. Co. has made formal reply to Judge Sweeney, who, representing the merchants committee, interviewed Wright regarding a settlement of the strike. Mr. Wright states that "the company has discharged no man because of his union sympathies or affiliations," and says "the company employs a large number of men belonging to unions other than the Western Federation of Miners whose official recognition is now demanded. In fact, when this strike was ordered these branches did not number 25% of all the company's employees, and that it also gives employment to a number of men who do not belong to any union. To recognize these branches of the Western Federation of Miners would be to put the whole body of employees at the dictation of a small faction. This demand being inadmissible, the company will never consent to it. I have therefore to inform you that the company cannot accede to the committee and that its decision as stated in this letter must be considered as final."

TUOLUMNE COUNTY.

S. W. Blakely has bonded the John Royal mine, 2½ miles northeast of Columbia, for \$6500, before Oct. 1, 1903, \$1625 cash. He agrees to sink 112 feet deeper on the vein.

Breasting gravel has begun in the Woodside drift mine on Table mountain, west of Columbia. The first day a miner picking gravel found a \$55 nugget, and several others were picked out of the gravel.

The Lost Fox mine, southeast of Carters, is running and the twenty stamps are dropping.

The Providence mine, near Carters, is down 1000 feet and the 10-stamp mill is running.

The Grizzly mine, south of Carters, is drifting on the 1000 level.

C. W. Quilty of San Jose, Cal., has deeded to B. W. Hersey the Sugar Loaf gravel mine on Corcoran flat; also Blue Lead placer claims.

T. W. Webb of Jacksonville has deeded

to C. Strathmore of San Francisco, Cal., a half interest in a water right on the Tuolumne river, to be diverted 2 miles east of Jacksonville; also the San Jose placer claim. Mr. Wehh retains a half interest.

The Punter mine at Campbell's Flat, near Seneca, is being unwatered to permit examination. The hoist on the Free Lance mine is completed and sinking resumed, with twenty men on the payroll.

It is reported that W. A. Neville, owner of the Rawlids mine, near Jamestown, with others, will build a railroad from Stockton to the mining region of Tuolumne county.

The Golden Gate M. Co., near Sonora, is using oil for fuel in its chlorination plant.

Superintendent M. C. Dale, at the Shoenberg, near Groveland, has the tunnel in 312 feet. Three shafts have been sunk on the vein, the deepest 85 feet, where the water came in too fast to be handled without pumps.

The Mayflower tunnel, near Groveland, is in 300 feet and driving ahead 9 feet per day with machine drills. It is the intention to run 200 feet farther before raising the gravel.

TRINITY COUNTY.

It is reported that the Shurtleff mine, near Weaverville, has been bought by the Sweep-takes Co. The Shurtleff mine is from 15 to 200 feet wide for 1000 feet. The ore assays \$6. It also carries copper.

The Journal says most of the mines on Coffee creek have shut down for the winter, with the exception of the Dorleska, on Union creek. The Three Peaks M. Co., on Battle Creek, near the Nash mine, 6 miles northeast from Dorleska, are getting in supplies and machinery.

The Nash gravel mine will run during the winter months.

On Deacon creek, M. Rose, of Redding, is hydraulicking.

The Golden Jubilee and Wagner mines, on lower Coffee creek, are shut down for the winter. It is said tunnel contracts will be let on the former.

The Streda mine near Carrville, has closed down for the winter, but the Headlight, on the same side of the river, continues.

Near Trinity Center, the Sykes gravel mine is working full handed; Superintendent E. Ellery.

The hoist at the Enterprise mine, near Weaverville, is in operation and the lower tunnel is in 900 feet, with 400 feet farther to run.

A contract has been let for driving 300 feet on the Jenny Lind and Maple tunnel, northwest of Coleridge. It is in 100 feet and will crosscut the lead 400 feet below the apex. These claims adjoin the Chloride-Balley. E. Ehrenberg is superintendent.

At the Headlight mine, near Carrville, Superintendent Fletcher says the 100-foot raise from the lower tunnel to the surface has been completed. A contract has been let for breaking daily seventy-five tons of ore. Three ore bins have been built with a capacity of 500 tons.

COLORADO.

BOULDER COUNTY.

At the Ben C. Lowell mine at Magnolia W. H. Hirschfeld reports ore on the 200 level showing free gold and telluride. Levels are being driven east and west with steam drills. At the 250-foot level the same ore is found. At the 325-foot level contractors have uncovered the same shoot.

F. Leonard, superintendent of the Cash mine, is working twenty-eight men. Some of the ore is sylvanite. A two-car shipment was made last week.

The Ward H. Lamon tunnel is in 500 feet. It will take 200 feet more to reach the vein.

The Cumberland tunnel, which is being driven under the India shaft, is in 1000 feet and in ore.

The surface strike of ore in the Livingston mine is being prospected by a drift northwest along the dike toward the Sphinx lode, an extension of the Livingston. Consolidation of the properties has been effected and G. Teal is manager of the new company. The company intends to sink a shaft. On the south end of the Livingston, in the Anchor group, a similar ore shoot has been opened, which will be developed by Topeka, Kan., men.

A strike in the Eldora, near Eldora, is reported in a winze sunk in the 125-foot level. A 20-inch vein has been found, assaying \$118 in gold. An inch and a half pay streak is rich.

The Wano at Jamestown, owned by an Eastern syndicate, has made a strike of low-grade ore. A. Brown, manager, says the vein is 30 feet wide. They will build a mill.

CHAFFEE COUNTY.

The Salida smelter is taking 200 tons daily from the New Monarch, 40 tons of iron from the Catalpa-Crescent, and a

large quantity of low-grade silver ore from the Dinero dump, Lake county.

The Columbus M. Co., owners of the Columbus mine in the Monarch district, near Salida, is again to be operated by its owners after being under lease and bond to the Sedalla Co. for two years. R. Good is superintendent. A tunnel is to be driven, the tram rebuilt and a concentrator put up.—Chinn & Roller have suspended operations on the Darling mine on account of snow.—G. Crosby, operating the Lilly, is shipping forty to fifty tons weekly.—The McDonald mine, owned by Eller & Co. of Pueblo, is shipping four cars per week. Fifteen men are at work. The Eclipse is shipping five cars weekly.—C. H. Moore, one of the owners of the Masen, says operations will be resumed. It is proposed to begin work at the Wilson mine and a 500-foot contract has been let.

CLEAR CREEK COUNTY.

A 200-ton concentrating mill and a 500 H. P. electric light and power plant are projected on a 200-acre tract on Snake creek, near Argentine, 12 miles from Georgetown, says Clear Creek Topics, by Pennsylvania and New York men, to treat ores of the Rothschild M. Co.

The Silver Glance mine has made a strike. This mine is 2 miles from Georgetown. After a long idleness J. H. Burkholder, O. Winn, G. Berg, O. Berg and Dr. Cline of Georgetown took a lease and bond on the property of eight claims. For two and a half years they drove the Queen tunnel on a level with the bottom of the shaft, which had been sunk 500 feet. After driving 1200 feet a crosscut was run toward the old shaft. While they were at supper the miners heard a noise like that of a cannon and a stream of water, 4 feet wide and 6 feet high, came from the tunnel, carrying everything with it. This lasted twenty minutes and the mine was drained. The vein was found and raises started, and four levels are being driven in one of the richest veins opened in camp within ten years. On the sixth level, east, is a streak of glance 20 inches wide, with 3 feet of good grade quartz. The same ore is found in two levels above. The machinery at the shaft, near the top of the mountain, will be moved and a shaft sunk on the vein from the seventh level. The crosscut from the Kelly tunnel will cut this vein at great depth.

Eight inches of peacock ore has been found in the Nashville in Russell gulch, near Idaho Springs. The vein is 6 feet wide of milling ore. The property is equipped with a whim and sinking will be continued. The claim is worked by Moscript, Ford, Huillet & Oliver. They also work an adjoining claim. A hoist will be placed on one or both of the properties.

The Old Stag G. M. Co., near Idaho Springs, is installing a plant for developing the Old Stag. The plant consists of a 12x14x16 steam driven Rand air compressor and a 60 H. P. boiler. The tunnel is in 200 feet; 500 feet more will reach the vein, 500 feet deeper than the Lamartine tunnel. H. H. Parmeter, superintendent.

CUSTER COUNTY.

In the Gold Wonder, $\frac{1}{2}$ mile east of Silver Cliff, a strike is reported of a low-grade ore body. C. Haskell and associates, the owners, will put in machinery and a mill.

Work is to begin on the Elematah lode, near the Bassick. It is owned by the Aburdix G. M. Co., of which G. W. Avery is superintendent.

The Bassick mine is working three shifts in the 1250 level; it is said the richest ore found is on the 1500 and 1600 levels. The ore is sorted and the high grade shipped to smelters and the low grade concentrated at the mill, the capacity of which is to be increased to 300 tons.

It is reported that the American Flag is to resume.

The Powhattan tunnel works two shifts. It is in 850 feet, and with an additional 100 feet the ore body previously opened in a winze in the Powhattan will be cut at 300 feet from the surface.

Ashland & Johnson, driving a tunnel on the Ethel vein, have found quartz, some of which is high grade.

Little & Hawker, working the South Humboldt, have made a shipment which returned gold, silver and lead \$64 to the ton.

The Toledo mine, near Silver Cliff, is to start up, the machinery being installed. The new buildings are completed; Superintendent G. Raymond.

At the Bull Domingo twelve men are working, one shift in the 550 and the other in the 1000 level.

DOLORES COUNTY.

McGill & Laube made a carload shipment of ore from their lease on a block of Newman ground near Rico last week.

Superintendent Nathan is arranging to install thirty more stamps in the Emma mill, at Dunton. While working in the fifth level stope last week, 1000 feet back

from the breast of the main tunnel, a minor broke into a pocket of wire silver. This ore will be shipped.

GILPIN COUNTY.

E. R. Fouts, D. Davies and G. Millor have organized the Grizzly M. M. & L. Co. and will operate the Grizzly lode at Russell gulch.

The Miners' Ore Sampling Works at Black Hawk is reported closed down, owing to lack of a market for the ores they purchased.

At the East Netaway mine Superintendent Draper says they have opened ore on the 180-foot level and that in the 120 level, east of the Mitchell shaft, they have ore carrying free gold. The south vein has been struck at a depth of 555 feet showing 1 foot of ore, but the pay shoot is to the east. Work is being carried on in the 200 and 250-foot levels of the Vivian and they both are in ore. The property is operated by the Town Topics G. M. Co.

During November the shipments from the Quartz hill properties of the Kansas-Burroughs Con. M. Co. were 214 cars. Most of the product was milling ore.

The Independent sampler at Black Hawk has suspended operations. It was run in connection with metallurgical works owned by the same company at Deadwood, S. D.

GUNNISON COUNTY.

The Post says the interest in the Brunswick M. & M. Co., owned by the Halsey heirs, has been sold to A. Lejune. The company owns the Mack mine, near Tin Cup, also a 100-ton concentrating plant. The operators are driving a tunnel into West Gold hill to cut the Mack vein at depth. There is in the upper workings milling ore besides shipping material. The mill will be partially remodeled. The Commercial group is being operated by its owners. The shaft, now 150 feet deep, will be sunk 100 feet farther, and a level run at that point. In the 150-foot level a foot of ore is showing which averages \$50.

The West Gold Hill M. Co. recently found a vein of ore in its tunnel hut the main vein has not been cut yet.

Hamlin & Reed have opened a 4-foot vein in a 70-foot shaft on the Nancy Hanks on West mountain in the Quartz Creek district.

The Ashland M. Co. has cut a vein of ore in the Carter tunnel at 1381 feet, assaying \$16.

The Post says the Akron M. Co. is making good headway driving into Lake hill at Whitepine. They expect to cut the North Star ore bodies early in the spring.

A. J. Underwood, operating the Bill Short near Whitepine, is shipping ore and expects to increase his output. A hoisting plant has been installed on the David H. The Eureka and Erie properties, operated by D. C. Tobin, are shipping eight to ten tons per day.

On the Nancy Hanks on West mountain, near Gunnison, Hamlin & Reed have run a drift from the bottom of their 70-foot shaft opening up a 4-foot vein. G. W. Duncan will sink the Commercial shaft on Gold hill 100 feet deeper, giving a vertical depth of 250 feet.

The Eureka and Nest Egg mines, at White Pine, are shipping eight to ten tons per day. The values are in silver and lead. The past summer twenty tons were daily treated by the Tomichi concentrator. The Bill Short, in the district, is shipping to the Salida smelter. A new hoisting plant has been installed at the David H. The Akron M. Co. is pushing the new tunnel. It is in 2000 feet and will soon cut the North Star ore bodies.

The Revenue group, in Box Canyon district, south of Ohio City, was recently bought by New York parties. A vein 6 feet wide is opened, assaying \$50 gold. A new road will be built and the necessary buildings and machinery will be placed.

LAKE COUNTY.

The New Valentine M. Co., near Leadville, has resumed operations and the two sinking pumps with a capacity of 800 gallons each are raising the water from the shaft.

Twin Lakes has a strike on Bull hill, on the Last Chance, in a vein 30 feet wide, carrying copper and gold. The company has started a tunnel to cut the vein. The Last Chance Co. owners propose to build a cyanide plant if the vein shows up well.

The Fryer Hill M. Co., which is handling water through its El Paso shaft, is getting its shafts and workings in shape and increasing its tonnage. In addition to the low-grade ore bodies in the old workings the company will carry on work in virgin territory. In the Tip Top and Bangkok-Cora Belle some good ore is being developed in new ground.

The strike made in the Cooper shaft at Leadville is supposed to be the continuation of the Fryer Hill ore shoot.

MINERAL COUNTY.

The Humphreys mill at Creede has

shut down to give the machinery an overhauling. All the ore about the mill and bins was cleaned up. The mines will continue work, but the ore will be shipped, the milling ore left standing until the mill resumes. Improvements are being made in the mill. A Chilli mill for fine grinding of the zinc has been installed and an elevator is being put in. The company have contracted for a steam power plant.

Last week the tenth north level of the Happy Thought cut the ore shoot, which is the farthest north the vein has been explored at that depth.

PARK COUNTY.

At Alma there is sufficient snow to retard mining and shipments, though many mines are working in a small way.

The London mine is shipping high-grade ore. The ore is hauled on sleds from the mine half way to the Colorado & Southern sidings, and transferred to wagons. The London is driving 1000 feet of new tunnel from the South Mosquito side of the mountain.

In Horseshoe district the Hill Top mine has resumed and will ship to smelters and operate its mill. The Last Chance mill is to treat ores from the Chance, Peerless and Peerless Maud mines.

Chicago men, incorporated as the Illinois-Colorado Oil, Gas & Coal Co., have built a plant, with derrick, power and other equipment for sinking 3000 feet in the South Park oil field near Alma. One thousand acres of land in this field have been bought by the People's Union Oil Co. of California, which will sink a well.

It is reported that connection has been made at the Hock Hocking mine between the tunnel upraise and the upper workings, draining those levels. With the draining of these levels the management expects soon to resume shipments of ore.

At the Arnette mine, being developed under lease and bond by A. D. Hunt of Leadville, is reported in the drift being run on the 50-foot level, a 15-inch streak of ore from which assays as high as seven ounces gold have been had. This is on the lime and porphyry contact. At a depth of 96 feet 3 feet of vein matter appears in the granite.

RIO GRANDE COUNTY.

Seventy-two thousand pounds of machinery, including cyanide tanks, are to be placed in the Annie mill by February 15th. P. Schuch, Jr., superintendent. In the event of success a new mill with a capacity of 100 tons per day will be put in.

SAN JUAN COUNTY.

The Old Times group on Bear mountain, near Silverton, made a 6-ton shipment last week, says the Miner. Smelter tests and other tests from a streak of ore 18 inches wide ran \$30. The latest test showed \$320 gold, \$13.10 silver and 20% lead. The vein is cut at the end of a 135-foot tunnel driven on the Old Times vein. It is the intention to drive all winter on development, and within 100 feet farther a vein 9 feet wide on the surface will be cut in the tunnel at a depth of 200 feet. This group lies near the Fitzhugh Lee group, which are being developed by the Woods Investment Co. of Colorado Springs.

J. T. Manners has bought the Edith claim on Tower mountain, near Silverton. The claim is on the same lead as the Dakota and Rowdy Boy. The Mogul mine is working forty men. The tunnel is in 2500 feet. Another 100 feet on the Ore tunnel was contracted for last week. One of the veins, thought to be the Manhattan, was cut last week by the Netaway Co. in the Thunder tunnel. The Alethea is the vein for which the tunnel is being run. The Tamarack M. Co. is the new incorporation of the Big Five Co. The properties are located on Tower mountain and a tunnel is proposed running from a point near Howardsville. Mr. Abbott is developing the Golden Wedge on South Lookout mountain. The vein is 10 feet wide and carries gold, silver and lead. Mr. Abbott owns 4500 feet on the vein.

The Smuggler-Union M. Co. at Telluride has resumed; 100 men were sent to the mine last week. The men were all Americans and Cornishmen. For a week men have been cleaning up the mine and the mill is in shape for work.

The Hurley tunnel at Silverton is advancing 7 feet per day and in 1700 feet. Machine drills are to be put in.

A 15-inch streak of gray copper ore in the upraise on the Lookout vein at Silverton has opened to a 4-foot body.

SUMMIT COUNTY.

The Cashier, Pride and small properties in the districts tributary to Breckenridge are employing 300 men. Shipments are regular and the sampler is busy.

Superintendent A. Boyd, the Fanchon M. Co., in Sugar Loaf district, is shipping ore. Returns have been received for one lot of fifty tons which netted \$1155. Two more lots are on the road. The shaft is

down 225 feet, with one drift on vein 175 feet and another 150 feet. The R. A. M. is shipping 100 tons per day of zinc ore. This comes from a body of ore previously developed. The intention is to increase the output.

The Breckenridge sampler handled over 1000 tons of ore and concentrates during November. The bulk of it came from the Mountain Pride at Breckenridge, the Nettie B. at Kokomo, the Pennsylvania at Argentine, the Pride and California at Montezuma.

In the Salt Lick placer, 1 mile north of Dillon, while doing assessment work, \$1300 worth of coarse and fine placer gold was taken out recently.

J. B. Conrad of Breckenridge, who has been developing the Ettigridge group on Little Mountain, has made shipments running from 300 to 400 ounces silver and from \$150 to \$250 gold, found a mass of native silver weighing three pounds on his claim.

The new machinery at the Cashier mine in Brown's gulch will treble the output. Fifty tons per day are being crushed by the 20-stamp mill.

Work has been resumed by the Puzzle Extension Co. Manager Achter says the upraise has 60 feet to go before connecting with the tunnel.

W. Condon and others are working the Pacific in Dry gulch, which produces lead and an oxidized gold ore.

Risley & Horn last week shipped twenty tons of lead ore that carries gold and silver from their property above timber line on Mount Baldy, near Breckenridge.

TELLER COUNTY.

The Doctor ore shoot is reported to have been cut by lessees in the bottom level of the Doctor-Jack Pot. Cripple Creek district. The Jack Pot M. Co. has granted a lease on the south end of the Iron Master lode of that company to S. Vidler of Cripple Creek for eighteen months and calls for 100 shifts of work each month. Vidler is operating on the adjoining 300-foot block to the north of this property.

The El Paso Co. have taken up their option on the Morning Star property, which consists of the Morning Star on Beacon hill and the Roy Fleming on Bull hill, near Cripple Creek. The Morning Star Co. is to dissolve and will pay its stockholders a final dividend of 5 cents a share, says the Times.

C. J. Garvin, recently superintendent of the Portland G. M. Co., Cripple Creek, has a two years' lease on the property of the Pappose G. M. Co.

The treasurer's report to the shareholders of the Cripple Creek Con. M. Co., Cripple Creek district, for the past year shows an income from royalties of \$3057.68.

The Chicago men working the Addie C on Mineral hill, Cripple Creek district, are obtaining assays on seams of ore in the crosscuts at the 430 level that run \$1000, says Superintendent Walsb.

In Cripple Creek district Hickman & Gilbert are sinking a shaft on the north end of the Sheriff claim and are down 30 feet in pay ore. The ground is west of the War Eagle. The Milwaukee syndicate, operating the Le Clair fraction on Raven hill, has its new machinery up and hoisting water from the shaft. A contract was let this week to sink. Horn, Archibald & Co., lessees on the 200 level of the E. Porter Gold King, have settled for their last shipment on a basis of \$52 a ton.

A strike has been made on the Ida May on Raven hill, Cripple Creek district. The junction of two veins has been found showing 4 feet of ore. The Little Frank S on Raven hill is shipping ore. At a depth of 320 feet the south extension of the Joe Dandy vein was entered last week. This vein is 4 feet wide and assays \$20. Shipments have begun.

All rock hoisted from the War Eagle, Cripple Creek, is shipped without sorting, an unusual thing, even for Cripple Creek.

The C. K. & N. Co. at Cripple Creek have paid a dividend of \$14,319. The property is located on the west slope of Beacon hill and is producing thirty tons of ore daily. Lessee Granfield is operating the property.

At 160 feet in the new shaft on the south end of the Golconda at Victor an ore body has been opened up. The vein is 4 feet wide and carries two ounces in gold to the ton.

Miners are employed on the Londonderry, Cripple Creek district, in proving the apex of the vein in controversy between the Wild Horse, owned by the United Mines Co., and the Londonderry. A jury is secured in the district court for the third apex suit of the Sunshine vs. the Sedan. The La Montagne M. & L. Co., operating on Block 8 of school section 16, is shipping medium-grade ore. At the 450-foot level a drift has been run 60 feet on the vein. It carries 2 feet of pay rock.

D. Weyand, president of the Jennie Sample Con. Co., Cripple Creek district,

says lessee Babbitt, operating on the main workings of the company, shipped last week a car of five-ounce ore from the 400 level. On the third level he is getting out coarse rock, a car of which ran 1.75 ounce per ton.

H. C. Doil, superintendent of the Ophir, is working a lease on the Minnebaha claim. He has run a tunnel on a vein and opened what appears to be the extension of the Gold Dollar under the wash. The vein is 6 feet wide.

Read, Morgan & Whetstone, lessees on the Morning Glory claims of the Work Co., have made a shipment of screenings which returned one ounce to the ton. This came from Block F where they opened the extension of the Jack Pot vein upon the line between the two properties.

It is reported that miners sinking the shaft on the west slope of Cow mountain, near Cripple Creek, have found a 2-foot vein which assays \$12 to \$20.

Lessee Granfield, on the C. K. & N., is shipping thirty tons per day.

The El Paso Con. mines on Beacon hill, Cripple Creek, are outputting thirty to thirty-five tons per day of the richest ore shipped in quantity from any mine in the Cripple Creek district. The mine has been troubled with water. It is being controlled. No attempt will be made at present to get below the 400 level.

The shaft house of the Bolivia of the Dorcas G. M. Co., near Gillett, was destroyed last week by fire. Loss to machinery is \$6000.

B. Ross and W. O. Temple are reported to have leased the Midland sampler at the head of Poverty gulch, Cripple Creek district, and will put in a large cyanide plant as soon as tanks can be secured.

A suit involving valuable claims at Victor has been filed in the United States Circuit Court. P. Brown of Lake Mills, Iowa, plaintiff, sues as a stockholder of the Mount Rosa M. Co., alleging mismanagement. The Woods Investment Co. of Colorado Springs is principal defendant.

IDAHO.

ADA COUNTY.

M. M. Gibson has organized a company to develop the Grant and Globe claims, 5 miles from Boise. A tunnel will cut the ledges in the Globe at 400 feet, and another will be 200 feet deep on the Grant No. 1. One of the ledges of the Globe is 14 feet ore. A concentrating plant will be built with a daily capacity of fifty tons. The company is the Idaho-Globe M. Co.

BANNOCK COUNTY.

A smelter is proposed at Pocatello by the Great Western M. & M. Co., which owns a group of seventeen claims known as the Hovey claims, 6 miles east of Pocatello, and near Mosquito Springs. A tunnel being driven is in 180 feet, tapping a body of ore 8 feet wide into which they have drifted 30 feet. The ore, it is said, will average 15% copper.

The Pocatello G. & C. M. Co., Ltd., is incorporated at Pocatello; G. H. Olmstead. The property is a group of copper claims on Pocatello creek, 8 miles east of Pocatello. The nucleus of the group is the Moonlight, which exposes a 2-foot vein of copper sulphides.

BLAINE COUNTY.

It is reported that operations will be resumed at the Red Cloud mines, near Hailey, with twenty men.

BOISE COUNTY.

The Ingle M. Co. is taking ore from the Golden Star at Centerville. Mr. Ingle has opened up a second vein not found by the former owners.

The men holding a bond on the Summit, near Idaho City, are repairing the mill.

A shaft is being sunk on the Ebenezer, near Quartzburg; ten men employed. W. D. Southworth has a bond on the property, also on Knight & Co.'s Mountain Chief, adjoining.

CLAYTON COUNTY.

The Valley Creek mill in Stanley basin is completed, but the cyanide plant is not yet ready. Four men will spend the winter driving a tunnel. The last loads of supplies for Stanley basin could not get through via Galena on account of snow, teamsters returning to Ketchum, whence they shipped by rail to Mackay.

ELMORE COUNTY.

The Lawrence Con. M. Co. has incorporated to operate the Jingo group of sixteen lode and two placer mines in the northern part of the county.

IDAHO COUNTY.

J. A. McEachern of the Buffalo Star M. Co. in Buffalo Hump district, says the tunnel has been driven 300 feet and a 500-foot shaft will be sunk in the spring. The ore cut is 30 feet wide, assaying \$10. The company put in a 10-stamp mill.

T. Parks and J. McKay, from Buffalo Hump, report 6 feet of snow in the Hump. The Big Buffalo is keeping up shipments

of \$10,000 bullion monthly and other mills in the camp are working steadily. They confirm the report of a strike in the Liberty Bell.

A find of placer gold and platinum is reported from Cottonwood of several acres in extent in a gravel deposit.

MINERAL COUNTY.

The Big Kanawha at Creede will not be compelled to shut down owing to drop in silver, as their product is principally gold and development work will continue. Creede ores contain a high per cent in silica, which is not usual with the shipping ores of the West. Properties affected by lower silver are the Commodore, Del Monte, New York, Bachelor, Corsair and Alpha. The Monte Carlo, Mollie S. and Punxsutawney produce chloride ore; the Big Kanawha gold, lead and zinc; the Solomon, Ethel, Moses and Ridge produce a lead and zinc ore. The leasers on the Ridge have struck a new ore shoot. The ore is a clean galena.

NEZ PERCE COUNTY.

A new gold-copper strike is reported, 7 miles northeast of Nez Perce and 3 miles from Pardee, and a large number of claims have been taken. The discovery was made by L. Ellis and G. Murray, who two weeks ago began to sink and at a depth of 20 feet cut through 3½ feet of copper glance.

SHOSHONE COUNTY.

In the lower tunnel of the Snowstorm copper mine large nuggets of galena and chalcophyrite have been found.

MICHIGAN.

HOUGHTON COUNTY.

It is reported that the Michigan C. M. Co., near Houghton, will build a one-head stamp mill in the spring, President Stanton having recently reached this decision.

The Butler tunnel of the Adventure mine, near Houghton, has cut the Evergreen lode, in 800 feet, the lode being the most southerly of the seven veins which cross the property. This tunnel cuts the lode 150 feet below the outcrop. The lode is also cut by the crosscut from No. 2 shaft, 250 feet below the outcrop. Two beads are running in the mill stamping 950 tons daily. A third head is to be started soon.

Reports from Houghton say the latest estimates of Lake production of copper are between 170,000,000 and 180,000,000 pounds of refined copper for the year 1902.

MONTANA.

CARBON COUNTY.

In Carbon county strata oil has been discovered by T. Cruise, of Helena, who says he has sunk four wells on Butcher creek, the greatest depth being 1400 feet. At 400 feet oil-bearing sands were encountered. A conglomerate of white sand and quartz pebbles was pierced, and found to be 40 feet in thickness. Another well at 400 feet into this same stratum brought a flow of oil which interfered with further sinking, and another well has been started.

FERGUS COUNTY.

The South Kendall group, comprising the Blue Jay, Silver Bow and Nipper claims, near Lewiston, are reported sold to H. S. Corbett of Spokane, Wash. Development work has been done on the claims.

FLATHEAD COUNTY.

In the Snowshoe and Fisher districts, operations are closed for the winter, owing to snow, which is 8 feet deep.

The Banner & Bangle mine, near Troy, is reported sold to P. Larson, T. Greenough and L. P. Larson for \$50,000. Superintendent L. P. Larson says it is a lead-zinc proposition and developed by tunnels on five levels. The lode is between quartzite and metamorphosed slate and is 4 to 10 feet wide. The lead and zinc are in separate shoots, the lead being in the form of galena.

The first payment is reported made on 1000 acres of placer ground on upper Libby creek by the Libby Placer Co.

GRANITE COUNTY.

The Call reports the Butte & Garnet M. Co. incorporated by J. Farrell, H. T. and D. Lewis, J. O'Rourke et al., to work the Grant & Hartford property at Garnet.

JEFFERSON COUNTY.

H. Freyler, manager of the New Boston Co. property, in the Corbin district, says he has struck a vein of copper and silver ore in the shaft of the Badger claim of the group owned by his company at a depth of 65 feet. He says 2 feet of the ore samples 12% copper and thirty ounces in silver. The shaft of the Bertha mine, which adjoins the Badger, is down 190 feet. In the Flambeau, adjoining the Badger on the west, 2 feet of ore is reported at a depth of 120 feet.

SILVER BOW COUNTY.

By a decision of the supreme court the Boston & Montana C. & S. M. Co. is given

complete ownership of the one-fourth interest in the Comanche mine at Butte, claimed by A. Wetzelstein. The lower court declared the company to hold a legal title in the property.

SWEETGRASS COUNTY.

A syndicate of Montana men propose to exploit the oil tracts in Sweetgrass county where oil has been known for some time, the oil-bearing strata of Carbon county, which borders Sweetgrass on the east, extending into it.

NEVADA.

LANDER COUNTY.

T. K. Coe, assistant superintendent of the Dead M. Co. at Dean, reports a strike in the tunnel connecting the Dean with the property bought from the Pittsburg & London Con. M. Co. on the opposite side of the hill. A lower tunnel is being run to tap the vein 500 feet deeper.

LINCOLN COUNTY.

The Silver King M. Co. of Nevada is incorporated to operate the J. B. McGee group of mines at Silver King, 35 miles west of Ploche.

The Good Hope mine at Searchlight is putting in a gas hoist. The prospect is being developed and a mill is to be considered later. Dr. Carber of Los Angeles, Cal., is principal owner.

There are three mines with mills in operation in Searchlight, employing 100 men.

Superintendent A. J. Rees of the Thistle M. & M. Co. of DeLamar reports a strike of 3 feet of ore similar to that in the Magnolia, near by. The ore was struck in a drift on the 100 level at 160 feet, and in running the drift they cut several small veins of iron and silver. From the 100-foot level they will sink the shaft another 100 feet.

STOREY COUNTY.

Rails, lumber and supplies have been delivered at the mouth of the Daney tunnel, where the Silver City M. & D. Co. has commenced the work of draining the Devil Gate and Chinatown districts. The tunnel is already in 800 feet and will be extended to the Kossuth shaft 9000 feet, which it will strike at a depth of 450 feet, where ore is known to exist. The company will follow the Daney vein through Spring Valley and extract ore. Electric wires are being strung for power and a mill will be built. It is the intention to extend to American Flat. J. H. Kinkead is superintendent.

NEW MEXICO.

COLFAX COUNTY.

A. C. Majors, secretary the New Mexico Oil & Gas Co., says he will begin drilling on the McKown ranch, near Raton, next week.

OREGON.

BAKER COUNTY.

An addition is being built to the mill at the Phoenix, near Sumpter. At the Hidden Treasure a hoist is being put in and other additions. The Forest M. Co. has been organized by the Advance M. Co., T. J. Costello, J. Collins, J. H. Pruitt, E. L. Manning, to develop the Storm King group in the Cable Cove district. There are seven claims in the group.

President L. C. Jacquish of the American D. & M. Co., owner of the Blue Canyon placers near Auburn, says they have Littlefield's water rights and placer grounds, on a three-year lease with option to purchase.

The Tempest Co., near Sumpter, is building a sawmill and intend to put in a water jacket furnace. They have finished 4 miles of road to join the Red Lion road from the Badger.

Near Sumpter the Morning group, owned by Simmons, Ames & Cooper, will put in a mill. The property has a large vein, between slate and a dike, the ore being 7 feet wide.

The Morning Glory mine, near Sumpter, is to put in machinery.

A vein of nickel ore is reported uncovered in the Panhandle district. The claim is in the copper belt, 10 miles from Ballard's Landing. J. J. Howard and R. McKimm are the owners. They have begun work on the Manila group of copper claims in the same belt.

GRANT COUNTY.

The machinery for the stamp mill to be erected at the Virginia in the Greenhorn district is on the ground. An air compressor is being put in at the Bluebird in the Granite district.

The Cougar mine will resume; thirty men are at work and more will be added. The roasting plant is finished.

JACKSON COUNTY.

J. W. Opp has started his quartz mill on the Golden Standard mine near Jacksonville.

JOSEPHINE COUNTY.

The Homestake property in Evans Creek district, 9 miles from Grant's Pass,

is reported bonded to Eastern men for \$8000.

KLAMATH COUNTY.

The mill at the Mattern mine is making a run, wood being obtained to supply furnaces for a time. There will be no continuous operation until spring, when electric power can be had. Power is to be supplied by the electric plant being constructed on Falls creek, above Klamath, 12 miles from the Mattern. It is expected to be ready by April 1.

The Jilison mine has its force increased. The ledge has widened. The mill is to be started.

The 500 level has been reached in the coal mine near Ager.

A third shoot of ore has been found in the Belcher, near Bonanza, says Superintendent P. A. Brady. The grade of ore is better than before. The face of the drift is 300 feet from the surface. Mr. Brady said it is the intention to build a mill, the building and frame being for twenty stamps, but ten would be put in at first.

At Bonanza the Gold Boy mine is reported sold to Eastern men. It is the east extension of the Bonanza. Development consists of two crosscut tunnels, 925 and 425 feet, respectively, driven to cut the three veins. A shaft on the extension of the Bonanza vein has a depth of 60 feet. It is intended to use the Empire mill, near by. J. H. Bolland is in charge.

While drifting on the 175 level of the Dixie Meadows mine, near Prairie City, a 7-foot vein was opened up, 3 feet of which is shipping ore. Three shifts are working in the lower tunnel, which is in 300 feet, and expect to reach the vein on the 300-foot level by February 15. An assay office has been added the past week.

SOUTH DAKOTA.

LAWRENCE COUNTY.

The Deadwood people owning the Potsdam group of mines at Cyanide are opening up a body of milling ore and propose to build a reduction plant in the spring.

The Hidden Fortune plant in the first ward, Deadwood, is about completed. The pump is being set up.

The machinery has arrived for the Golden Crest 10-stamp wet crushing cyanide mill, on the head of Two Bit gulch, 5 miles southeast of Deadwood. There are fourteen tanks in the plant, of Oregon fir. It will have a capacity of fifty tons a day. Water will be supplied from the main shaft of the Golden Crest mine, 225 feet deep and filled to within 75 feet of the top with water. The ore is found in vertical veins.

The Gold Hill M. Co. is putting in a new 80 H. P. boiler at the shaft in Spearfish canyon, and when in position sinking will be resumed. Indications are that the shaft is nearing quartzite. Ore of good quality was found in the shaft when work was stopped a few weeks ago. The company will put in an air compressor and drills as soon as crosscutting begins. R. C. Patterson of Omaha, Neb., is president. There are several ore bodies on the upper horizon carrying \$6 a ton in gold.

F. Ames, superintendent the Wauconda mine at Lead, reports in a crossdrift from the shaft on the Wauconda vein seven samples covering 28 feet across the vein, with only one wall in sight, show an average of \$1 per ton.

UTAH.

BEAVER COUNTY.

G. Reynolds and J. Hamilton are sinking a double-compartment shaft on the Colossal group of twenty-three claims adjoining the Larkspur, in Beaver Lake district. They are down 30 feet and have a body of copper ore.

JUAB COUNTY.

The shaft of the Raymond mine, north of Eureka, is down 1200 feet, and will be sunk another 300 feet, says Superintendent J. C. Sullivan, and prospecting continued. It is supposed that the ore bodies of the Gemini extend north into the Raymond territory.

Superintendent J. Eustis is pushing work on the Emma Jane Con. mine, north of Eureka. The shaft is down 110 feet and sinking continues. A whim has been placed on the property. Assays show gold, silver and copper.

C. Christenson has bought a one-fourth interest in the Midgeley No. 2 claim, in the western part of Tintic district, near Eureka.

SALT LAKE COUNTY.

In November the St. Joe tunnel, near Bingham, was driven 106 feet. The shafts of the Fire King of the St. Joe group are drained by the tunnel and work will be resumed there.

Electric drills with a gasoline engine driving the generator are in operation at the properties of the Hlawatha Co. in Big Cottonwood canyon, near Salt Lake City. The tunnel is expected to cut the vein in

the next 250 feet. Ten men are at work. In the upper workings on the property ore is being opened up.

SUMMIT COUNTY.

H. C. Brownlee, manager of the St. Louis-Ontario M. Co., at Park City, says the ledge opened in a crosscut from the bottom of the shaft has been cut for 20 feet. The shaft will be sunk another 100 feet and the vein tapped at 208 feet.

TOOELE COUNTY.

The Electric M. & M. Co. has incorporated to operate in the Clifton mining district.

In the Plomo group of Stockton, of which M. Gisborn is the owner, 10 feet of manganese has been opened up in the crosscut from the 100-foot level of the incline. Gisborn is putting up a boarding house and other surface improvements.

WASHINGTON.

FERRY COUNTY.

E. R. Delbridge, superintendent the California mine at Republic, has contracted with the Hall mines smelter to handle 500 tons of California second-class ore. There will still remain 3000 tons of the same ore on the dump. The first grade ore is shipped at the rate of two carloads per week. The shaft has reached the 500-foot level and a crosscut started.

SNOHOMISH COUNTY.

Upraising to connect with the shaft has been commenced on the Bunker Hill-Sullivan. The upraise will have to be driven about 60 feet to connect, when an abundant air supply will be assured. The ore was crosscut 30 feet below.

Work is resumed on the Copper King, near Index. A crosscut is being driven to tap the ore. The ore is chalcopryite. W. Cornwall of Index is superintendent. A steel ore car has arrived for the Libby.

STEVENS COUNTY.

The Cascade Marble & Onyx Co. has incorporated; E. T. Jargenson, J. McWhir, H. F. Nather. The company owns marble properties between Addy and Colville.

Eastern men are said to be negotiating for the marble quarries 2 miles west of Northport.

Work has been resumed on the Walter Scott, near Northport.

WYOMING.

CARBON COUNTY.

The Osceola mine, in Encampment district, has been sold to the North American Copper Co. The mine was owned by Richards, Chatterton, Cosgriff Bros. of Fort Steele, J. M. Rumsey of Rawlins, F. A. Hadsell, R. E. Smiley and O. Gramm. The mine joins the Ferris-Haggerty, recently bought by the same company.

Another platinum strike is reported in the Rambler district, on the Lookout Jack claim, which has been worked by Laramie people for gold.

The North American Copper Co. is pushing work for an early spring run. On last pay day \$20,000 was paid out for labor.

At the company's mine, the Ferris-Haggerty, men are in demand, particularly laborers.

The frame of the power house at the North American C. M. Co.'s smelting plant, near Encampment, is up and the building nearly enclosed. The machinery in the concentrator is being set up.

Superintendent L. Tennant will put in an air compressor for the Moon-Anchor property near Encampment. The shaft will be sunk 200 feet more.

CROOK COUNTY.

The first carload of tin ore from the Forest City mines has been run through the crushers at Deadwood, S. D. The ore comes from the tin mines of the Bear gulch district, which have been bonded by an English syndicate. The intention is to make an experimental run of 300 tons to determine the value of the ore and the proper method of treatment.

FREMONT COUNTY.

(Special Correspondence).—The Dexter M. & Dev. Co. of Atlantic City will erect a 100-ton mill and large electric plant. This company owns 6000 acres of patented placer ground; are operating the Bryan mine and will start the mill on the Tahor Grand; ore is free milling; property is 90 miles from the railroad. D. G. Cahoon, Rochester, N. Y., is president; E. W. Sehon, Denver, Colo., consulting engineer.

SHERIDAN COUNTY.

Superintendent T. T. Tynan has sold a tract of State lands near Sheridan underlaid with coal. Two hundred acres were sold at prices ranging from \$10 to \$105 per acre. The Sheridan Fuel Co., which has mines at Dietz, was one of the principal buyers. One tract of land, containing 460 acres, was sold to Mr. Dietz of Omaha. T. Toole of Saint Joseph, Mo., bought 600 acres adjoining his mine at Minersville, 3 miles north of Sheridan.

FOREIGN.

BRITISH COLUMBIA.

Of the find of native copper on No. 1 level of the Velvet mine near Rossland, Manager W. J. Gray says: "On this level we have opened three shoots of ore, and during prospecting took out eighty-five tons of \$35 ore. The gold values run from an ounce up, with 5% to 6% copper. Ore bins are full, and shipments to the Northport smelter resumed, sending fifteen to twenty tons daily. The past month work has been confined to No. 2 level, owing to necessity of shutting down hoisting apparatus, which was transferred from a wooden to a concrete foundation. On the fifth level we have a shoot over 50 feet in length, from 3 to 5 feet wide. Recent discoveries on the first level are east of former workings. On No. 1 level of the Portland is a shoot of copper ore which will be cut by drifting from the Velvet."

A company has been formed at Rat Portage to develop a deposit of mineral paint near there.

The B. C. Co. is putting up a slag elevator at its smelter at Greenwood.

With the week ending December 19 the total ore shipments from Boundary mines for 1902 reached 483,353 tons. Boundary ore is being shipped and treated at the rate of 2000 tons daily.

It is reported the Western Fuel Co. has bought the interests of the new Tacoma Coal Co. and includes the coal hunkers and plant of J. Rosenfeld & Sons and J. C. Wilson, of San Francisco, Cal., and the Howard plant at Oakland, Cal. J. L. Howard, of Oakland, Cal., is president. The company's mines are at Nanaimo, on Vancouver Island.

General Manager E. B. Kirby, of the War Eagle and Center Star mines at Rossland, says a preliminary concentrator will be built this winter and a larger plant later, if the 2% tax is removed. The Rossland-Kootenay Co. is considering a reduction works to handle the iron sulphide ore of the property.

The second furnace of the Montreal & Boston Copper Co. smelter at Boundary Falls will be blown in in the early part of January, says Manager Goodell.

MEXICO.

COAHUILA.

J. Castellot has organized in Monterey, Nuevo Leon, the Monterey Coal Co. for the exploration and development of 50,000 acres of coal lands in northern Coahuila.

SONORA.

The foreman of the Arizona-Mexico C. Co., known as the Povedora Co., reports to W. E. Defty and W. C. Foster, officers of the company at Phoenix, Ariz., that the tunnel has been started, the cut and the tunnel being in ore. In previous preliminary work an open cut had been made in face of croppings for 35 feet. The vein is 165 feet in width. It is intended to sink a shaft near the croppings and run a tunnel from the foot wall. The property is southwest of Altar and 40 miles from the coast.

At Cananea, with eight converters in blast, the Greene Con. C. Co. is reported producing 5,000,000 pounds of copper per month.

The Prospect says a mass of native copper was taken from the Cananea mine of the Greene Con. C. Co. weighing forty pounds. It is 3½ feet long, 18 inches wide, thin and irregular in shape.

KLONDIKE.

It is reported J. J. Rutledge has been given a concession for dredging gold by the Canadian government. The grant is for the exclusive dredging privilege on Forty Mile, from its junction with the Yukon to the boundary line of Alaska and the British Yukon.

Commercial Paragraphs.

ABOUT Feb. 1, 1903, the F. W. Braun & Co.'s San Francisco, Cal., establishment will be moved from 63 First St. to their new building, 34-36 Spear St., San Francisco, Cal.

THE Independent Electric Light and Power Co., of San Francisco, Cal., has reduced its charges for motive power from the former rate of 4 to 4½ cents to a flat 3 cents per kilowatt hour, to take effect January 1, 1903.

THE Mine & Smelter Supply Co., through their New York office, have orders for two Kinkead mills and five Wilfley tables for export. The main office in Denver has purchased the entire stock and good will of the Standard Fire Brick Co. of Denver and Pueblo, Colo. The Mine & Smelter Supply Co. will handle the entire product of the above company in the assay supplies. They will now carry a complete line of assay supplies in each of their branch houses as well as in Denver.

Personal.

H. KEY is superintendent Adventure mill, Houghton, Mich.

R. GOOD is superintendent the Columbus M. Co., Salida, Colo.

J. W. LANDIS is in charge of the Maybelle mine at Gold Hill, Or.

GEO. J. BANCROFT has returned to Denver from Florence, Colo.

S. KNAPP, of Encampment, Wyoming, has returned there from Denver, Colo.

J. E. HEWSTON has returned from Searchlight, Nev., to San Francisco, Cal.

F. L. SIZER, M. E., has been examining mining properties near Helena, Montana.

R. FRAME, superintendent Smuggler-Union mill, Pandora, Colo., is in Denver, Colo.

G. T. INGERSOLL is remodeling the May Day dry concentrating mill at Tintic, Utah.

E. C. LIMBACH of Denver, Colo., is examining mines at Ocampo, Chihuahua, Mexico.

A. BUCKBEE, manager Virtue mines, Baker City, Or., has gone to Montreal, Canada.

C. R. RAY, manager Gold Hill mines, Gold Hill, Or., has gone East on mining business.

W. H. DALE succeeds J. Quinn as superintendent at the Sampson, Bingham, Utah.

J. BRUL is superintendent of the Spur Daisy mine in Eureka district, Gilpin county, Colo.

T. R. GRIFFITH, manager of the Augusta M. Co., Breckenridge, Colo., has gone to Pittston, Pa.

D. FISHER, superintendent Spagnoli mine, Jackson, Cal., is in San Francisco, Cal., to buy a new hoist.

T. FITZGERALD is superintendent the Portland M. Co., Cripple Creek, Colo., vice Mr. Garvin, resigned.

MANAGER FARNSWORTH of the Horn Silver mine has returned to Salt Lake City, Utah, from New York.

R. M. FOREE, president of the Arizona-Colorado Copper Co. at Globe, Ariz., has gone to Santa Fe, New Mexico.

J. M. LOWE, secretary of the Pitkin Gold Belt M. & R. Co., is in Gunnison, Colo., from Galveston, Texas.

R. H. MCD. HANCOCK succeeds G. P. Macker as mining engineer of the Adventure property, Houghton, Mich.

W. S. BUCKLEY, manager Ophir Con. M. & M. Co., Telluride, Colo., has returned there from Denver, Colo.

J. B. WARNER, manager Ledge M. & M. Co., Red Mountain, Colo., has returned there from Denver, Colo.

EMERSON GEE, manager California King G. M. Co., Pichacho, Cal., has returned there from Denver, Colo.

SUPERINTENDENT HARMON of the Penn Chemical Co., Campo Seco, Calaveras county, Cal., has gone East.

MANAGER WINSLOW and SUPERINTENDENT CHASE of the Liberty Bell mine Telluride, Colo., are in Denver, Colo.

T. L. ODDIE has been elected general manager and H. C. West superintendent Tonopah Fraction M. Co. at Butler, Nev.

GENERAL MANAGER D. MCVICHE of the Bingham Consolidated M. Co., of Bingham, Utah, has returned from Boston.

E. M. JOHNSON, chief chemist Grant plant, Denver, Colo., has resigned, to accept a position as manager of a smelter at Iola, Kans.

SUPERINTENDENT NATHAN of the Emma M. & M. Co. at Dunton, Dolores county, Colo., has returned there from Denver, Colo.

SUPERINTENDENT C. J. GARVIN of the Portland G. M. Co., Cripple Creek, Colo., has resigned to operate leases on his own account.

J. A. DIGGLES, metallurgist, and R. N. Diggles, assayer, for the Melones M. Co., Melones, Calaveras county, Cal., are in San Francisco, Cal.

T. A. PATESON, JR., superintendent American Hill mine, near Forest City, Sierra county, Cal., has gone to New York for a few months.

W. H. DAVIS, Supt. Smuggler-Union mill, Telluride, Colo., has returned to Boulder, Colo., until such time as the mill will resume operations.

F. CHAPPELET, JR., superintendent Mohican mine, near Groveland, Tuolumne county, Cal., has returned to the mine from Oakland and San Francisco, Cal.

L. C. JACKLING, manager of the United States S. & R. Co. of Canyon City, Colo., and D. M. Gray, ore buyer for the company, have been inspecting Leadville, Colo., district.

New Patents.

DEWEY, STRONG & CO.'S SCIENTIFIC PRESS PATENT AGENCY, 330 Market St., S. F., has official reports of the following U. S. patents issued to Pacific coast inventors:

FOR THE WEEK ENDING DECEMBER 16, 1902.

715,735.—COIN APPARATUS—Albert & Wiggins, Salem, Or.
715,938.—FONT OF TYPE—J. H. Ames, Portland, Or.
715,938.—LIFE PRESERVER—J. E. Armstrong, Santa Cruz, Cal.
715,939.—LOG RAFT—J. Ayres, Portland, Or.
715,972.—TRANSP. RING APPARATUS—C. H. Butler, O. K. and, Cal.
716,205.—CONCENTRATING TABLE—W. G. Dodd, S. F.
716,029.—BUILDING CONSTRUCTION—S. Giletti, S. F.
716,030.—NAIL MAKING MACHINE—J. H. Goetsche, S. F.
715,783.—FRUIT PEELER—L. F. Graham, San Jose, Cal.
716,356.—VALVE—T. R. Green, Anaheim, Cal.
715,929.—GARBMENT CLEANER—W. Harbough, Santa Barbara, Cal.
716,043.—LAMP M. S. Hufschmidt, S. F.
716,246.—EXCAVATOR—A. Klatt, Collinsville, Cal.
715,823.—FRANZIS—A. Leitz, S. F.
716,031.—FRUIT—S. W. Luitwiler, Los Angeles, Cal.
716,053.—COMPOUND—M. McWhorter, Milton, Cal.
716,077.—HANDLE SOCKET—T. Mottin, S. F.
715,848.—PENCIL SHARPENER—D. F. Oliver, Fruitvale, Cal.
715,849.—PENCIL SHARPENER—D. F. Oliver, Fruitvale, Cal.
715,851.—DRILL COUPLING—L. C. Preston, West, Or.
716,111.—CAN BODY MACHINE—Ross & Wachhorst, S. F.
716,131.—OIL BURNER—C. W. S'evert, Los Angeles, Cal.
715,990.—SIGNATURE GATHERER—D. M. Smyth, Pasadena, Cal.
716,149.—CLEARING—F. Steinkamp, Bethany, Cal.
716,149.—STEP LADDER—M. E. Trafton, Los Angeles, Cal.
716,320.—TELEPHONE—R. I. Willmarth, S. F.
715,923.—PRINTING FRAME—W. G. Wood, S. F.
715,926.—SHOW CASE—O. Yates, Portland, Or.

Notices of Recent Patents.

Among the patents recently obtained through Dewey, Strong & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

CONVEYING APPARATUS—No. 715,471. Dec. 9, 1902. F. R. French, San Francisco, Cal. This invention relates to improvements in transportation systems whereby it is desired to convey by means of suspended cables a burden in either a longitudinal, transverse or vertical direction in relation to a certain surface area. It consists of suspended cables, a burden carrier adapted to be supported upon and to be moved by said cables, independent fall lines whereby the burden may be deposited or taken up at any point, means for supporting said fall lines, and means for operating said lines and cables. There is also an automatic discharge device between the fall rope and the load whereby the load is discharged by the movements of the rope.

BUILDING CONSTRUCTION.—No. 716,029. Dec. 16, 1902. Secondo Giletti, San Francisco, Cal. The object of this invention is to devise a form of construction in which the walls shall go up story by story in advance of the metal framework that is to bind the whole into a rigid structure. It comprises tubular blocks laid in courses, so as to have their openings disposed to form a series of vertical flues; metal columns are inserted at intervals in these flues with anchor plates to which these columns are secured, and means are provided upon these columns which project beyond the interior wall surface by which the floor and ceiling girders may be supported. The other details of construction, the whole forming an improvement in wall and partition construction and girder supports in buildings of combination stone or brick and steel.

LIFE PRESERVERS.—No. 715,938. Dec. 16, 1902. J. E. Armstrong, Santa Cruz, Cal. This invention consists of an arrangement of floats and connections by which they are applied to the body in such a manner that the body is automatically positioned and turned with the face upward, and the head and face so supported that the latter is above the surface of the water, and the person is prevented from being strangled or drowned.

FONTS OF TYPE.—No. 715,936. Dec. 16, 1902. J. F. Ames, Portland, Or. This invention consists of an improved font of type having independent 'codies, each having a character on one end, said 'codies having opposite sides corrugated continuously from top to bottom in parallel transverse lines extending from edge to edge of the body, and with the corrugations of adjacent bodies adapted to interlock throughout the height of the bodies, each of said bodies having a channel formed in one edge parallel with the character-bearing face, and at right angles to the corrugations.

TRANSPORTING AND DISTRIBUTING APPARATUS.—No. 715,972. Dec. 16, 1902. C. H. Butler, O. K. and, Cal. This invention relates to an apparatus which is designed for the purpose of transporting goods, such as grain or other products in sacks, from a source of supply, such as a vessel, and distributing them at various points throughout a warehouse or other place of storage. The object of the invention is to dispense with the trucks and with all but a few of the men needed for piling the grain. This is effected by the construction of a trough or surface A, extending through the warehouse or other point of deposit at such an elevation as to be substantially above the highest point to which the sacks are to be piled. This trough or surface may extend through the center, if the building be wide, or near one side, or in very wide buildings a plurality of these surfaces may be provided.

THE CALIFORNIA DEBRIS COMMISSION, having received applications to mine hydraulic process from Frank Mining Co., in Sailor Flat Hydraulic Mine, near Nevada City, Nevada County, Cal., draining into Sailor Flat Creek which reaches South Yuba River; from A. A. Goodman and A. C. Kinnear, in Sage Hill Mine, near Michigan Bluff, Placer County, Cal., draining into Skunk Creek, which reaches Middle Fork of American River; from Frank Joseph, in Frank Joseph Mine, near Watson Gulch, Shasta County, draining into Roaring River which reaches Sacramento River; and from Alfred Dixon, et al., in Big Gun Gold Mine, near Michigan Bluff, Placer County, Cal., draining into Poor Man's Creek which reaches American River, gives notice that a meeting will be held at Room 96, Flood Building, San Francisco, Cal., Dec. 29, 1902, at 1:30 P. M.

Latest Market Reports.

SAN FRANCISCO, Dec. 24, 1902.

METALS.

SILVER.—Per oz., Troy: London, 22½d (standard ounce, 925 fine); New York, bar silver, 48½c, refined (1000 fine); San Francisco, 48½c; Mexican dollars, 38 @ 39c San Francisco, 38c New York.

No material change in silver within the past week, fluctuations being too small to deserve notice.

COPPER.—New York: Standard, \$10.75; Lake, 1 to 3 casks, \$11.65; carload lots, \$11.30; Electrolytic, 1 to 3 casks, \$11.45; carload lots, \$11.25; Casting, 1 to 3 casks, \$11.35; carload lots, \$11.10. San Francisco: \$14.00. Mill copper plates, \$17.00; bars, 18@24c. London: \$51 7s 6d spot per ton.

LEAD.—New York, \$4.12½; Salt Lake City, \$3.50; St. Louis, \$4.00; San Francisco, \$4.50, carload lots; 4½c 1000 to 4000 lbs.; pipe 5½, sheet 6, bar 5½c; pig, \$4.75. London: \$10 16s 3d per ton.

SPELTER.—New York, \$4.80; St. Louis, \$4.50; London, \$19 17s 6d per ton; San Francisco, ton lots, 6½c; 100-lb lots, 7c.

ANTIMONY.—New York, Cookson's, 9½c; Hallett's, 8½c; San Francisco, 1000-lb. lots, 10c; 300 to 500 lbs., 11c; 100-lb. lots, 13@15c.

TIN.—New York, pig, \$25.95@26 00; San Francisco, ton lots, 27c; 500 lbs., 27c; 200 lbs., 27½c; less, 28c; bar tin, \$32.50. London, \$117 15s spot.

PLATINUM.—San Francisco, crude, \$18.00 per oz.; New York, ingot, \$19.00 per Troy oz. Platinum ware, 75@80c per gram.

QUICKSILVER.—New York, \$45 50@46 50; large lots; London, \$3 15s; San Francisco, local, \$46.00 per flask of 7½ lbs.; Denver, \$49.50. Export, \$43.50.

BABBITT METAL.—San Francisco, No. 1, 10c; No. 2, 7c; No. 3, 6½c; extra, 17½c; genuine, 35c; Eclipse, 37½c.

ALUMINUM.—New York, No. 1, 99% pure ingots, 35c; No. 2, 90%, 30c to 34½.

SOLDER.—Half-and-half, 100-lb. lots, 18c; San Francisco, Plumbers', 100-lb. lots, 15.10c.

NICKEL.—New York, 50@60c per lb.; ton lots, 45@48c.

STRUCTURAL MATERIALS.

IRON.—Pittsburg, Bessemer pig, \$24 25; gray forge, \$21.15; San Francisco, bar, 3c per lb., 3½c in small quantities.

STEEL.—Bessemer billets, Pittsburg, \$28.00@30.00; open hearth billets, \$32@34 00; San Francisco, bar, 7c to 12c per lb.

CHICAGO CURRENT QUOTATIONS.

Bessemer.....	\$25.30@26.00
Foundry Northern 1.....	24.00@25.00
Northern 2.....	23.50@24.50
Northern 3.....	23.00@24.00
Southern 1.....	24.15@25.15
Southern 2.....	23.65@24.65
Southern 3.....	22.15@24.15
Forge.....	22.65@23.65
Charcoal.....	26.00@27.00
Billets, Bessemer.....	33.00@34.00
Bars, iron.....	1.80@1.85
Bars, steel.....	1.75@1.80
Rails, standard.....	28.00@30.00
Rails, light.....	34.00@40.00
Plates, boiler.....	1.90@2.00
Tank.....	1.75@1.80
Sheets, 26 store.....	2.90@3.00
No. 27.....	3.00@3.10
No. 28.....	3.10@3.20
Angles.....	1.75@1.80
Beams.....	1.75@1.85
Tees.....	1.80@2.00
Zees.....	1.75@2.25
Channels.....	1.75@2.25
Steel melting scrap.....	19.00@19.50
No. 1 railroad wrought.....	19.50@20.50
No. 1 cast, net ton.....	17.50@18.50
Iron rails.....	25.00@25.50
Car wheels.....	23.00@24.00
Cast borings.....	10.50@11.00
Turnings.....	13.75@14.00

CEMENT.—Germania, \$2.50@2.75; K. & B. S., \$3.00; Hawthorn, \$2.90; Trowell, \$2.90; Portland, \$2.50@2.75 per bbl.

LIME.—Santa Cruz, \$2.25; Roche Harbor, \$2.25 per bbl.

LUMBER.—(Retail): Pine, ordinary sizes, \$20.00@22.00; extra sizes higher; redwood, \$22.00@23.00; lath, 4 feet, \$4.25 @4.50; pickets, \$19.50; shingles, \$2.35 for No. 1 and \$2.00 for No. 2; shakes, \$13.50 for split and \$14.50 for sawed; rustic, \$26.00 @32.00.

NAILS.—Per keg (list prices): No. 20d to 60d, Wire, \$3.30; Cut, \$3.30; 10d to 16d, Wire, \$3.35; Cut, \$3.35; 8d, Wire, \$3.40; Cut, \$3.40; 6d and 7d, Wire, \$3.50; Cut, \$3.50; 4d and 5d, Wire, \$3.60; Cut, \$3.60; 3d, Wire, \$3.75; Cut, \$3.75; 2d, Wire, \$4.00; Cut, \$4.00. Special rates for carload lots.

GENERAL SUPPLIES.

POWDER.—F. o. b. San Francisco: No. 1, 70% nitro-glycerine, per lb., in carload lots, 15½c; less than one ton, 17½c. No. 1½, 60%, carload lots, 13½c; less than one ton, 15½c. No. 1** 50%, carload lots, 11½c; less

than one ton, 13½c. No. 2, 40%, carload lots, 10c; less than one ton, 12c. No. 2* 35%, carload lots, 9½c; less than one ton, 11½c. No. 2** 30% carload lots, 9c; less than one ton, 11c. Black blasting powder in carload lots, minimum car 728 kegs, \$1.50 per keg; less car lots, \$2 per keg.

CAPS.—3x, \$5.50 per 1000; 4x, \$6.50; 5x, \$8; Lion, \$9, in lots not less than 1000.

FUSE.—Triple tape, \$3.60 per 1000 feet; double tape, \$3.00; single tape, \$2.65; Hemp, \$2.10; Cement No. 2, \$3.00; Cement No. 1, \$2.65, in lots of 3000 feet and up.

CANDLES.—Granite 6s, 16 oz., 40s., 10½c per set; 14 oz., 40s., 9½c.

CHEMICALS.—Cyanide of potassium, 98%—99%, jobbing, 25@26c per lb.; carloads, 24@24½c; in 10-lb. tins, 35c; sulphuric acid, in carboys, 66½ B, 2c per lb.; soda ash, \$2.00 per 100 lbs.; hyposulphite of soda, 2½@3c per lb.; blue vitriol, 5½@6½c per lb.; borax, concentrated, 7@8c per lb.; chloride of potash, 12@13c; roll sulphur, 3c; alum, \$2.00@2.25; flour sulphur, French, 3½@3¾c; California refined, 2@2½c; nitric acid, in carboys, 8c per lb.; caustic soda, in drums, 3@4c per lb.; Cal. s. soda, bbls., \$1.25 @1.50 per 100 lbs.; ska, \$1.05; chloride of lime, spot, \$2.50@2.60; nitrate of potash, in bbls., 8c; caustic potash, 10c in 40-lb. tins; sulphide of iron, 9c per lb.

COAL.—San Francisco, coast, yard prices: Wellington, \$8.50; Seattle, \$6.50; Coos Bay, \$5.50; Southfield, \$8.00. Cargo lots, Eastern and foreign: Wallsend, \$6.50; Brymbo, \$7.50; Pennsylvania, hd., \$14.00; Scotch, \$8; Cumberland, \$12; Cannel, \$9.00; Welsh Anthracite, \$13.00; Rock Springs, \$8.50, long ton; Colorado Anthracite, \$14.00. Coke, \$10.50 per ton in bulk, \$13 in sacks; Sunnyside, \$8 50, long ton.

OILS.—Linseed, boiled, bbl., 54c; cs., 59c; raw, bbl., 52c; cs., 57c; lots of 5 bbls., 1c less; Lucol oil, boiled, bbl., 48c; cs., 53c; raw, bbl., 46c; cs., 51c. Kerosene—Pearl, per gal., 22½c; Astral, 22½c; Star, 22½c; Extra Star, 24c; Eocene, 23½c; Elaine, 26½c; Water White, in bulk, 16c; Mineral Seal, iron bbls., 18c; wooden bbls., 20c; cs., 24c; Mineral Sperm, cs., 26½c; Deodorized Stove Gasoline, bulk, 17c; do. cs., 23½c; 56° Gasoline, bulk, 21c; do. cs., 27½c; 63° Naphtha or Benzine, deodorized, in bulk, per gal., 16c; do. in cs., 22½c; Lard Oil, No. 1 bbl., 95c; cs., \$1.00; Neatsfoot Oil, bbl., 70c; cs., 75c; No. 1 bbl., 55@57½c; cs., 57½@60c; Sperm, crude, 50@60c; Natural White, 65c; Bleached do, 70c; Whale Oil, cs., 50@55c.

WHITE LEAD.—Per lb., in kegs: Five tons and over at one purchase, per lb., 6c; 1 ton and less than 5 tons, per lb., 6½c; 500 lbs. and less than 1 ton, per lb., 7c; less than 500 lbs., per lb., 7½c; in 25-lb. tin pails, 1c per lb. above keg price; in 1 and 5 lb. tin cans, 100 lbs. per case, 2½c per lb. above keg price. Dry Lead—In bbls., 1 ton and over, 6c; do. in kegs, 6½c.

RED LEAD AND LITHARGE.—One ton and over at one purchase, per lb., 6c; 500 lbs. and less than 1 ton, per lb., 6½c; less than 500 lbs., 7c.

ASSAY LITHARGE.—Per lb., 8½c. BISMUTH.—Subnitrate, per lb., \$1.60. BONE ASH.—4c per lb.

BORAX.—Crystal, 7c; calcined, 25c.

CHROMIUM.—(90% and over) per lb., \$1.25.

COPPER.—Carbonate, 20c; Red oxide, 30c, 60c.

MANGANESE.—(90% and over) per lb., \$1.25.

MERCURY.—Bichloride, per lb., 90c.

MOLYBDENUM.—25c. per gramme; 1000 grammes—2½ lbs.

PHOSPHORUS.—(American) per lb., 80c.

SILVER.—Chloride, per oz., 75c; nitrate, 55c.

SODIUM.—Metal, per lb., \$1.00.

URANIUM.—Oxide, per lb., \$3.50.

ZINC.—Metallic, chemically pure, per lb., 50c.

ZINC.—Dust, per lb., 10c.

ZINC.—Sulphate, per lb., .04c.

(These prices are wholesale, f. o. b. San Francisco, unless otherwise noted.)

SITUATIONS WANTED.

Wanted, position as assayer or assistant, Jan. 1st. References. Address Box 18, this office.

Superintendent, competent assayer, chemist and surveyor, experienced in development work, wishes position in any capacity. "Seattle," this office.

Cyanide man and assayer wants position. Can take shift on mill if needed. Practical experience and reliable. C. F., Mining and Scientific Press.

A sober, industrious young man desires a situation as surveyor, assayer, draughtsman and bookkeeper. Has had three years' technical training and three years' practical experience in gold and quicksilver. Am conversant with the estimation of ore and the preparation of maps and reports. Best of references as to ability and character. Address "M," care of Mining and Scientific Press.

An energetic young man, thoroughly conversant with the indications, occurrence, mining and reduction of quicksilver ores, wishes a situation as superintendent of a quicksilver property. Technically trained. Can handle men to advantage and am thoroughly acquainted with the duties of the office. All references as to character and ability. Address "Quicksilver," care of this office.

Engineer at present in field will be open for engagement Feb. 1st. Will engage with substantial people by the year as manager, superintendent or engineer, or, if field is open, for lesser position, subject to advance upon results obtained. Thorough in technic and practice. Successful with men. Credentials the best. Address E. D. B., this office.

Competent and reliable technically educated man, 34 years of age, desires position with a good mining company. Has had wide experience in the handling of low-grade gold ores where economy was essential to success. Can give best of references. Address L. D. H., care Mining and Scientific Press.

Competent Millman, Machinist and Chemist. Experience free mill and concentrating. College education. Have built and operated mills in Montana for 13 years. Competent accountant and able to administer affairs of a company. Would like situation with a company out of a promoter's hands. References the best. Address H., care this office.

Wanted, position as mill superintendent or foreman of an amalgamation and concentration mill; have had 18 years' experience; am a good machinist and understand handling all kinds of machinery; can furnish best of references; at the present time hold the position of superintendent for one of the largest companies in the State of Colorado, but wish to change and will go to any country. Address H. D., care of Mining and Scientific Press.

DIVIDEND NOTICE.

San Francisco, Dec. 23, 1902.
To the Stockholders of the Jamison Mining Co.—At a meeting of the Board of Directors of the Jamison Mining Company held this day, a dividend of \$11.700, being three cents per share on all the Capital Stock of the Company, was declared payable at the office of the Company, 620 Howard Building, San Francisco, Cal., on Monday, January 19, 1903.

Payment will be made to the Stockholders on personal application or on duly signed order presented at the office of the Company, or checks will be mailed in accordance with proper instructions and order addressed to the Secretary.

Transfer books will be closed at 12 o'clock noon on Saturday, January 17, and reopened at 9 o'clock A. M. on Tuesday, January 20, 1903.

SAM. W. CHEYNEY, Secretary.

Quicksilver

BY THE FLASK OR CARLOAD.

WEIGHT AND QUALITY GUARANTEED.

The Eureka Company,

OF SAN FRANCISCO.

320 SANSOME STREET. - SAN FRANCISCO.

Quicksilver

IN LOTS TO SUIT.

Write for Quotations.

REDINGTON & CO., 23-25-27 Second Street.

SAN FRANCISCO, CAL.

THE CALIFORNIA DEBRIS COMMISSION, having received application to mine by hydraulic process from Andrew B. Jacks in the Ruth Placer Mine, near Meadow Valley, Plumas Co., Cal., draining into Small Creek which reaches North Fork of Feather River gives notice that a meeting will be held at Room 96 Flood Building, San Francisco, Cal., Jan. 5, 1903, at 1:30 P. M.

DEWEY, STRONG & CO.

PATENTS

330 MARKET ST. S.F.

SCIENTIFIC PRESS

PATENT AGENCY

PNEUMATIC TOOLS.

Boyer Hammers,

Pneumatic Hoists,

Little Giant Drills,

Air Compressors.

BRAEBURN SPECIAL MINING

DRILL STEEL.

INCANDESCENT LAMPS.

ECCLES & SMITH,

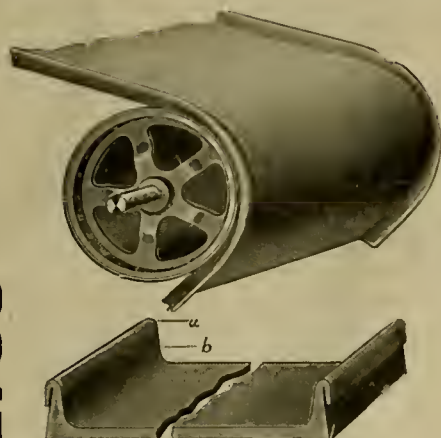
91 FREMONT ST., SAN FRANCISCO, CAL.

SEATTLE, WASH.



SIX YEARS' CONSTANT WEAR WITHOUT A BREAK.

1700 BELTS IN USE.



THE BROWNELL "PATENT LIP" FLANGE FRUE VANNER BELTS.

JAS. S. BROWNELL, San Francisco, Cal.—DEAR SIR:

We have been using your "Patent Lip" flange belt on our "Triumph" Concentrators since May, 1895, and find that they have given better wear than any other belt made. Also the twelve 6-foot Frues with "Patent Lip" flange belts, lately put in here, are giving us every satisfaction. Yours truly,

THE EMPIRE MINES,
GRASS VALLEY, NEVADA CO., CAL., Jan. 29, 1901.

G. W. STARR, Managing Director.

JAS. S. BROWNELL, San Francisco, Cal.—DEAR SIR:

The eight "Patent Lip" flange belts purchased from you in December, 1895, have been in constant use in the mill since that time, and have given the best of satisfaction, and have proved to be far superior to the old plain flange belt which we were using. The belts now in use show hardly any wear, and seem to be in as good condition as when first put on the machines; one thing, they do not show any tendency to crack along the edge of the belt.

Yours truly,

PIONEER-LYNN MINING COMPANY,
TOWLE, PLACER CO., CAL., Jan. 12, 1901.

JERRY SULLIVAN, Superintendent.

For any information regarding Frue Vanner or Belts, call on or address

JAS. S. BROWNELL, Western Manager FRUE VANNING MACHINE CO.
(Successor to Adams & Carter.) 132 MARKET STREET, ROOM 15, SAN FRANCISCO.



CALIFORNIA WIRE WORKS,
46-48 FREMONT ST., COR. MISSION, SAN FRANCISCO, CAL.

WIRE ROPEWAY

For Transporting Ore, Fuel, Earth, Sugar Cane, etc.

SIMPLE, ECONOMICAL, PRACTICAL, DURABLE. Loads Mechanically. Dumps Automatically.

WIRE TRAMWAYS (Single and Double Rope Systems).

TRANSMISSION BY WIRE ROPES. INCLINE PLANES. LOGGING BY CABLES. AUTOMATIC LOADERS.

IMPROVED GRIP PULLEY--Saves Wear on Rope.

PLANTS DESIGNED, SUPPLIED AND ERECTED. Estimates Furnished.

Eastern Agents: MACOMBER & WHITE ROPE CO., 19-21 Canal St., Chicago, Ill.

Westinghouse Multipolar Motors



Westinghouse Multipolar Motor.

For Pumping, Hoisting or any other Class of
Mine Work, save Labor and Maintenance Cost.

Write nearest District Office for Circular 1042.

Westinghouse Electric & Mfg. Co.
Pittsburg, Pa.

Sales Offices: San Francisco, 425 Market St.; Denver, Mountain Electric Co.; Seattle, 314 Occidental Ave.;
Los Angeles, 324 S. Main St.; and all other large cities.

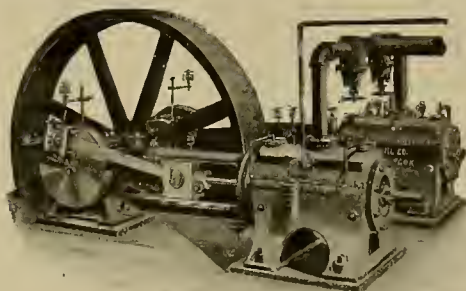
Air Compressors

SEVERAL SIZES AND STYLES CARRIED IN STOCK.

Engines and Boilers,
Hoisting Engines.

Rock Drill and
Smelting Plants.

Rock Crushing and
Pulverizing Machinery.



Ingersoll-Sergeant Duplex Class "D" Air Compressor.

Knowles Steam Pumps,
Pulsometer Steam Pumps.

Air Lift Pumping Plants,
Water Wheels.

Standard Diamond Rock Drills.

We are in a Position to Furnish Estimates on the Machinery and Erection of Complete Plants.
Write us for Catalogues and Prices.

HARRON, RICKARD & McCONE,
21-23 FREMONT STREET, SAN FRANCISCO, CAL.

INDEX TO VOLUME LXXXV

OF THE

Mining and Scientific Press

FROM JULY TO DECEMBER, 1902

A

	PAGE.
Abandonment of Mining Claim.....	292
Abbe Engineering Co.....	260
Abrasive Material.....	292
*Absorbent Roller.....	61
Absorption of Joplin, Mo., Properties.....	87
Of Public Lands.....	321
Accidents in Mining, First Aid.....	146
Avoided in Mines.....	364
Acetate of Zinc.....	265
Acetic Acid Diluted.....	306
*Acetylene Gas Generator.....	284
Gas.....	45
Acids and Zinc Smelters.....	85
*Actuating Mechanism for Jigs for Washing Ores.....	224
Adams, W. J.....	62
Adaptability of Wire Rope Transportation.....	248
Advance of Gold Dredging.....	172
In Mining and Metallurgy.....	277
Advertisers and Subscribers.....	321
"Advertising Out" Co-owner.....	338
Literature Standardized.....	83
Mines.....	71
Africa Barren of Silver.....	217
Africa's Principal Mineral Region.....	365
Aggregate Gold Yield of California.....	32
Aid to the Injured in Mine Accidents.....	146
Ainsworth, Wm., & Sons.....	116
*Air Compressor.....	37
Compressing Apparatus.....	192
Compression, Comparative Cost of.....	148
Compressor at Different Altitudes.....	20, 100, 173, 233, 306
Compressor, Duty of.....	142, 264, 278, 306, 325
Compressor Lubrication.....	336
Compressors, Automatically Controlled.....	351
Cylinder Capacity.....	306
Drills, Working Pressure of.....	336
Drying for Blast Furnaces.....	357
For Pump Interheated.....	188
Pressure.....	3, 173, 217
Pressure, Loss of.....	306
Pump.....	103
Pump Direct Connected.....	20
Required for Coal Combustion.....	351
Required for Drilling Machines.....	173
Temperature at Different Altitudes.....	217, 233
Altchelon, Rolt, Perforated Metal Co.....	139
*Ajax Mine, Victor, Colo.....	60, 35
Alabama Mines.....	11
Alabandite.....	351
Aladdin Reading Lens.....	35
Alaska Mines.....	11, 38, 52, 64, 77, 92, 106, 119, 134, 152, 166, 194, 225, 241, 256, 272, 285, 299, 315, 339, 343, 356, 372
Alaska-Treadwell Operations.....	20, 25
Alcohol's Effect on Metals.....	32
Alkalinity of Cyanide Solutions.....	142
Alis-Chalmers Co.....	15, 42, 66, 110, 111, 123, 128, 139
Alloyed Steel Annealing.....	276
Alloy That Expands When Cooling.....	32
Alloy for Steam Fittings.....	336
Of Good Tensile Strength.....	336
Resembling Gold.....	233
Alloys of Aluminum.....	217
Of Alkali Metals.....	193
Of Copper and Silver.....	113
Almaden Quiksilver Mines.....	216
Altitude and Air Temperature.....	217
Of California and Colorado Mines.....	332
Altitude's Effect on Air Compressors.....	20, 100, 173
Aluminum.....	112
Alloy.....	217
Coating With Other Metals.....	233
Lubricant for.....	202
Soldier.....	56
Aluminum's Present Use.....	165
*Amalgam Trap.....	292
Gold In.....	292
Plateau Sweated.....	332
*Amalgamating Metals.....	132
A Copper Plate.....	142, 219
Pao, Evolution of.....	176
Plates, How Cleaned.....	306
Amalgamation and Extraction.....	217, 336, 354
And Temperature of Water.....	216, 306
Methods, Avoiding Loss of Mercury.....	356, 366
Of Silver Ores.....	56
With Vaporized Quicksilver.....	113
*Amalgamator.....	25
Amending Mining Law.....	16
American Chemical Society.....	185
Engineering Works.....	97, 123, 296, 316, 364
Institute Electrical Engineers.....	193
Institute Mining Engineers.....	126, 206
Mining Congress.....	263
Smelting & Refining Co.....	7, 6, 13, 170, 172, 216, 276, 282
Standard Boiler H. P.....	29, 97, 394
Steel & Wire Co.....	29, 97, 394
America's Supremacy in Electrical Field.....	20
Ammonia Sulphate of Copper, How Made.....	3
Ancient California River Beds.....	200
Ophiolite Site of.....	370
River Channel.....	133, 200
Aneroid Barometer.....	173
Angels, Cal., Railroad.....	276
Annealing Alloyed Steel.....	128
Annual Output of Lead.....	32
Anode Residue Treatment.....	284
Antidote to Arsenical Poisoning.....	202
For Cyanide Poisoning.....	3
For Lead Poisoning.....	56, 100
Antimony.....	56, 100
Antiquity of Assaying.....	56
*Antiseptic Telephone Mouthpiece.....	117
Apex and Side Lines.....	113
What It Is.....	217
*Apparatus for Exposing Beds of Watercourses and Conveying Material Therefrom.....	234
For Concentrating Magnetic Iron Ores.....	37
For Electrolytic Treatment of Ores or Silices.....	91
For Extracting Metals From Ores.....	149
For Leaching Ores.....	91
For Making Blue Prints by Electric Light.....	202

*This mark indicates that the article indexed is illustrated.

	PAGE.
*For Obtaining Metals by Electrolysis.....	357
*For Oil Ore Separation.....	25
*For Producing White Lead.....	206
*For Recovering Minerals Carried Off in the Fumes of Smelting Furnaces.....	37
*For Roasting Ores.....	314
*For Separating Metals From Their Ores.....	165
*For Separating Ores.....	91
*For Thawing Frozen Ground.....	180
*For Treating Pulverized Ores of Gold or Silver.....	192
*For Use in Extracting Precious Metals From Their Ores.....	240
Appeal From Land Office Rulings.....	322
Application of Geology to Mining.....	145
Approximate Value Gold Specimens in Quartz.....	322
Arbitration.....	30, 323
Arc Lamps.....	113
Argentine, Richest of Silver Ores.....	142
Arid Lands of the United States.....	180
Arizona Freight Rates to Texas.....	84
Mines.....	26, 33, 52, 64, 77, 92, 106, 119, 134, 150, 165, 173, 194, 203, 225, 256, 272, 285, 299, 315, 329, 343, 358, 372
Statehood.....	2
Arrests.....	217
Arsenic in Quicksilver Ore Assay.....	264
*Recovery of From Ores and Metallurgical By-products.....	131
Arsenates in Roasting.....	232
Arsenic Poisoning, Antidotes to.....	280
Arthur, C. W.....	280
*Art of Blasting.....	255
Asbestos Filter Free of Duty.....	64
Found in Serpentine.....	233
Mines of Canada.....	46
Ash in Steam Coal.....	306
Ashe from Coal.....	173
Asphalt-Coated Flumes.....	264
Assay of Copper Materials for Gold and Silver.....	71
How to Get Correct.....	157
Melt With Carbon Therein.....	306
Of Cyanide Solutions.....	218
Ton.....	322
Ton System.....	233
*Assayer's Furnace.....	235
Certificates.....	232
Assaying Copper Ores and Products.....	4, 24
*And Melting With Oil Furnaces.....	49
Antiquity of.....	49
Cyanide Solution.....	56
Gold for Coining Purposes.....	219
Gold or Silver at U. S. Mint.....	71
Notes on.....	337
Of Chalcopyrite.....	173
Quicksilver Ore.....	364
Sulphide Ores.....	113
Zinc Precipitates.....	32, 186
Assays Unaffected by Altitude.....	45
And Mill Tests.....	217
Assessment on Option.....	185
Work for 1903.....	335, 363
Wagon, 24, 45, 84, 113, 142, 157, 185, 217, 216, 249, 296, 311, 333, 351	
Assouan, Egypt, Dam.....	350
Atlas Car & Manufacturing Co.....	303
*Atmospheric Products.....	98
Air, Weight of.....	249
*Attachment for Hydraulic Nozzles.....	165
Austin, F. C., Manufacturing Co.....	82
Australia a Producer and Seller of Silver.....	110, 171, 174, 213, 347
Australian Mines.....	110, 171, 174, 213, 347
Mine Department Report.....	63
Mine Salaries.....	51
Austrian Mines.....	122, 244
Authority for Statements in This Paper.....	3
*Automatic Dumping Device.....	74
*Bucket Dumping Mechanism.....	314
Control of Air Compressors.....	351
*Dumping Frame for Shaft.....	313
*Stop and Lock for Oil Well Casing.....	133
*Water Motor.....	86
Average Elevation of New Mexican Mining Camps.....	71
Avoiding Accidents in Mines.....	364
Loss of Mercury in Amalgamation.....	356, 366
Avoldupols and Troy Weight Compared.....	322

B

Bahilit Metal.....	20
"Baby" Drill.....	365
Back Numbers of This Paper, Price of.....	233
Balcomb, J. B.....	130
Band Saw, Tension of.....	142
Bank Cannot be Corporation Treasurer.....	113
Bar for Tension Test.....	322
Barium Dioxide in Cyaniding.....	279
Sulphate.....	249
Bark, Removal of From Mine Timbers.....	142
Barometer, Aneroid or Holsterio.....	264
Barometric Measurement of Height Differences.....	142
"Barrel of Copper," What It Means.....	249
Copper.....	217
Barrels, Measurement of.....	3
Bartlett, C. O., & Snow Co.....	55, 275
Battery Renewals of Sal-ammoniac.....	173
For Primary Electrical Action.....	217
Plates, How Cleaned.....	306
Sample Assay.....	157
Water Heated.....	351
Baume °, What It Means.....	217
Bay Counties Co.'s Power Lines' Capacity.....	64
*Belcher and Red Rock Mines.....	336
*Belshaw, C. M.....	311
Belt Friction and Pressure.....	202
Power Transmission.....	202
Belt, How to Put On.....	249
Bell Line, Location of, in Shaft.....	365
Bending Pipes.....	113
Bennett, S. G.....	6
Best Manufacturing Co.....	303, 325
Bettels Process.....	292
Betty Process.....	292
Bigelow, D. E.....	156, 347
Bins for Ore.....	351
Bismuth Precipitated Quantitatively.....	233
Silver Alloy.....	128
Black Sand, Iron From.....	265
*Blast Furnace Building, Washoe Co., Butte, Montana.....	140
Furnace.....	357
Furnace Gas in Gas Engines.....	105
Furnace Practice for Iron Ore.....	157
*Blasting Fuse.....	314
By Knox System.....	365
Tough Rock.....	365
Blende 1% Sulphur.....	20
Blowpipe Analysis.....	64
Blow Pipe Gas in Gas Engines.....	105
Blue Mountain Forest Reserve.....	236
Blue Printing by Electric Light.....	45
Paper, How Made.....	142
Prints, How Made by Electric Light.....	202, 232
Prints, How Turned Brown.....	202
Prints, How Waterproofed.....	84, 100
*Boilers and Boilers.....	254
Boiler Expansion and Contraction.....	173

Explosions From Low Water, How Prevented.....	100
Firing With Oil.....	7, 24, 36
Horse Power.....	142, 157
How to be Treated When Laid Up.....	249
*Internally Fired.....	117
Scale Prevention.....	58, 83
Setting of Shafts.....	323
*Solvents, How Introduced.....	254
Steam Pressure.....	278
Testing.....	100
Water Put in, Without Pumping.....	365
Water Requirements of.....	336
When Good and Economical.....	20, 351
Why It Explodes.....	45
Boilers, Effect of Oil Fuel Thereon.....	28
Bolts in Stone-work, How Fixed.....	249
*Bon Air Shaft, Leadville, Colo.....	356
Bonding Mine Property.....	99
Bonnets of Valves.....	202
Book Notices.....	16, 155, 213, 260, 289, 318, 363
Books and Serials.....	31
Borax, Production of.....	110
Borneo Mines.....	132
Bornite.....	132
Bose, M. P.....	74
*Bosworth Crusher.....	76
Boulders, How Broken.....	345
Bounty on Lead Production in Canada.....	126
*Box Electric Rock Drill.....	320
*Mortar in Stamp Mills.....	239, 334, 362
Braun, W. V.....	239, 334, 362
Breaking Strain of Manila Rope.....	202
Brent, Chas.....	49
*Briquetting, How It Is Done.....	21, 155
Ore Dust.....	306
*Plant, Washoe Co., Butte, Montana.....	140
British Columbia's Proposed Arbitration.....	36
Lead Conditions.....	176
Mine Taxation.....	112
Mines.....	14, 29, 40, 55, 67, 81, 96, 110, 122, 138, 153, 154, 169, 182, 198, 213, 228, 241, 258, 259, 275, 288, 302, 318, 332, 347, 361, 375
Mining Claim.....	332
Mining Conditions.....	201
Broderick & Bascom Rope Co.....	319
Broken Creek Shaft.....	125
Broken Hill Proprietary Co.'s Report.....	125
Bromine Process Gold Extraction.....	142
Brown-Corliss Engine Co.....	275
Brown, R. S.....	338
Brushing Battery Plates.....	306
*Bucket Dumping Device.....	74
Dredging.....	310
Dumping Mechanism.....	314, 342
*Buffer Device for Rock Drills.....	271
Buttington, J. M.....	289
*Building Dams.....	37
*For California University Mining College.....	304
*Subaqueous Foundations.....	118
Bureau of Standards.....	57
Burning Tin Oil Screens.....	332
Burt Steel, Regeneration of.....	392
Bursting Pressure Gauge Glass.....	332
Burt Manufacturing Co.....	41, 259
Business of Copper Mining.....	125
A Matter of Principle.....	232
*Butte, Montana, Smelting Structures.....	140
Miner's Opinion.....	237
Montana Zinc Reduction Works.....	322
By-products in Cord of Wood.....	322
From Rand Cyanide Works.....	131
From Rand Stamp Mills.....	117
In Charcoal Making.....	201

C

Cabinet Department Mines and Mining.....	201, 215
Cable Transmission.....	264
To the Philippines.....	349
Cadmium.....	202
Calamine.....	84
Calced Blende of Sulphur.....	20
Calcium Carbide, Cost of.....	186
Calculating Volume of Water Flowing From Tank.....	278
Value of Mining Property.....	166
Working Energy of Water.....	156
California Electrical Works.....	183
Debris Commission.....	32, 44, 89, 90, 162, 249, 293
Chlorination Plants.....	365
Debris, Source of.....	113
Electrical Progress.....	127, 293
Fine Gold Production.....	32
Gold Nuggets.....	351
*Head Frame.....	309
Hydraulic Mine Licensees.....	162
*Iron Deposits.....	290, 294
King G. M. Co. Cyanide Plant.....	336
Measurement of Water.....	45
Miners' Association.....	202, 232, 245, 277, 293, 294, 351
Mines.....	11, 12, 26, 38, 52, 64, 77, 92, 106, 119, 134, 150, 166, 179, 194, 209, 225, 241, 256, 272, 285, 296, 299, 315, 329, 330, 343, 344, 358, 359, 372.
Mining Frauds.....	216
Mining Industry.....	9
Mining Law.....	217, 218
Oil Companies.....	202
Oil Field.....	340
Oil Production.....	113, 322
*Relation of Rainfall to Run-off.....	6
*Restraining Barriers.....	69, 90
State Mining Bureau.....	3, 32, 216, 306
Tin.....	84
*University Mining College.....	304
Water Rights.....	20
Wire Works.....	66
California's Aggregate Gold Yield.....	32
Fuel Oil.....	44, 284
Mineral Products for 1901.....	56
Cambinetti Act.....	249
Canada's Nickel Supply.....	331
Canadian Asbestos Mines.....	46
Bounty on Iron and Steel.....	233
Bounty on Lead Production.....	126
Built Vessels.....	284
Mines.....	110, 154
Mining Institute.....	56
Cannanea, Mex., Copper Production, Cost.....	351
Candle Power, an Obsolete Term.....	56
Candlee, Cost of per Man.....	284
Carload of.....	100
Cost of.....	292
Number of Used on a Shift.....	202
Capacity of Bay Counties Co.'s Power Lines.....	142
Or Mine Car.....	249
Or Pump Cylinder, How Figured.....	3
*"Capital Wanted".....	31
Trusts and Labor Trusts.....	305
Carbonate of Barium.....	284
Carbon in Cast Steel.....	20
Carbide, How Made.....	305
Carbons for Arc Light, How Made.....	24
Carborundum.....	249, 292
Card Index Suggested.....	44
Carload of Candlee.....	100
Of Ore.....	3
Carmichael-Bradford Process.....	262
Carnotite.....	296, 314
*Car, To the Under.....	284
*Cessal Water Wheel.....	3

PAGE.	PAGE.	PAGE.	PAGE.
Condensing Engines, Water Required for..... 322	Cyclone Drilling Machine Co..... 111	Dynamite Cartridges, Weight and Size..... 56	F
Engine..... 58	Cylinder Head Packing..... 58	Composition of..... 123, 292	Factor in Modern Mining, Milling and Smelting..... 143
Conductors of Electricity..... 217	Steam Boiler, H. P. of..... 157	Molature in..... 292	Failure to Do Assessment Work..... 336
*Con. Mercur. Utah, G. M. Co..... 164	Surfaces Heated by Steam Jacket..... 173	Prices of, in Butte, Mont..... 249	Failures in Hydraulic Mining..... 50
Constant of Flumes..... 384		Dynamo for Igniting Charges in Gas Engine..... 45	Fairbanks, Morse & Co., 97, 123, 183, 214, 259, 313, 334
Construction of Wire Ropes..... 304		Run by Gasoline Engine..... 32	*Feeder for Explosives Engines..... 176
Of Flumes..... 293			Field Notes Governing Metals and Bounds of
Of Quartz Mill..... 351			Patented Property..... 322
Of Stamp Mills..... 186			Fifty Thousand Volt Electric Transmission in
*Of Tunnels..... 296			Montana..... 50
*Ogden-Lucin Cut-off..... 292, 296			Filaments of Electric Lights, How Made..... 219
Contact Vels..... 351			Filing and Turning Steel..... 113
*Context at Idaho Springs, Colo..... 47			*Filter Bed for Chlorination Barrels..... 91
Control of Silver Market..... 328			*Press at Sunshin, Utah..... 127
*Converter..... 328			Processes for Slimes Treatment..... 127
*Conveyor..... 10			Finder of Largest Gold Nugget Dead..... 160
Copeland, J. W..... 246			Fine Gold Produced in California..... 32
Copper Converters..... 7			Silver, How Produced..... 3
Bearing Orss..... 351			Finer Issues of Mining..... 266
Combining With Mercury..... 173			Fireproofing Wood..... 116
Determination, Volumetric..... 51			First Aid to the Injured in Mine Accidents..... 146
Electrolytic Extraction of..... 283			Electric Light Plant on Steamship..... 306
Estimation of by Potassium Permanganate..... 283			Elevator Bucket Gold Dredger..... 56
From Sulphide Compounds..... 126			"Fissure Vels" and "Ore Breaks"..... 126
Gold Alloy..... 126			Fitch, C. H..... 5, 46, 120
In Northern California..... 62, 72			Flat Bins for Ors..... 351
In Silver Collage..... 292			Flouring of Quicksilver, How Corrected..... 322
Latent Reduction in Refined Copper..... 123			Flow of Water, How Utilized..... 129, 217
Mining Business and Technology..... 123			*Fluid Pressure Operated Tool..... 106
Ore Assays..... 4, 24			Flums Construction..... 293
Ors, Forms of..... 30			Purpose of..... 142
Ors Leaching..... 3, 187, 216			Fluorite and Fluorine..... 365
Ors Reduction..... 167			Flux for Cyanide Slimes..... 32
Ors Reformed..... 60, 75, 85			Folding of Earth's Crust..... 1
*Ors That Will Pay..... 3			Foot of Water, What It Is..... 100
Percentage of Like Superior Ors..... 328			Force and Resistance..... 157
Plate Amalgamation..... 123, 219			Of Blow Struck by Air Drill..... 58
Price of..... 246			Of Explosives..... 43
Production, Cost of..... 57, 351			Forst Reserves..... 263, 350, 363
Production of..... 123			Preservation..... 293
*Recovery From Metallic Precipitate..... 240			Fortelurs of Mining Claim..... 292
Refined Electrolytically..... 302			Of Olin..... 338
Silver Alloy..... 123			Formation of Ors..... 113
Silver Alloys..... 113			Importance of..... 324
Standard..... 113			Of Nuggets..... 309
Sulphides..... 276			Of Townsites..... 336
Tubing..... 3, 254			Forms of Copper Ore..... 30
Wire, Resistance of..... 173			*Formula for Requisite H. P. for Stamp Mill..... 322
Coppering Iron..... 276			Formula of Measurements..... 217
Copper's Affinity for Sulphur..... 32			Frauds and Fakes in Mines..... 305
Corrosion of Boilers, Preventive..... 56, 74			Fraudulent and Blackmailing Mining Schemes, 233, 247
Cost of Air Compressor..... 146			Fres Air..... 306
Equivalents of Coal and Oil..... 157			Air Used in Threes-Inch Drill..... 202
Figures Furnished by Engineers..... 157			Frisht on Zinc Ors..... 64
Of Black Hills Cyanide Plant..... 3			From Chicago to Gragon..... 186
Of Candles per Man..... 264			From From Arizona to Texas..... 64
Of Coks Gvens..... 302			French Mines..... 305
Of Copper Production..... 57, 351			Fretion Diminished by Oil..... 196, 365
Of Electric Power..... 117			And Pressure on Belts..... 202
Of Gold and Silver Production..... 166			Resistance in Water Flow..... 100
Of Gold Production Lessened..... 126			Filtered Holes..... 336
Of Handling Ore..... 3			Filing Debt..... 56
Of Mineral Surveys in Arizona..... 132			For Boasting Ors..... 324
Of Moving One Ton by Horse Power..... 117			*Form of Weekly Report..... 335
Of Raising Water in Western Minn..... 157			*For Boasting Ors..... 324
Of Shovelings, Coal Ors..... 118			Frost-Proof Mortar..... 326
Of Sinking an Inclined Shaft..... 336			Fuel Economizer..... 336, 340
Of Slimes Plant to Treat Tailings..... 336			Gil in California..... 44, 156
*Of Square Set Timbering..... 159			Oil on Railways..... 200
Of Telephone Plant..... 249			Value of..... 71
Per Ton of Stopping Ore..... 322			Value of Coal and Oil..... 266
Costs at Alaska-Treadwell Min..... 75			*Valve for Gas Engine..... 165, 217
Of Hydraulic Mining..... 35			*Arrester..... 306
Courset of Steam in Boiler Plant..... 351			*Furnace..... 284
Covering Exposed Steam Pipes..... 100			*Blower..... 271
Coverings for Steam Pipes..... 100			*Feeding Apparatus..... 63
Crane Co..... 196			*For Assayers..... 255
Crankshaft of Gas Engine..... 171			*For Boasting Ors..... 324
Crawford, C. P..... 67			*For Separating Zinc From Gves..... 306
Credit of Mining Engineering..... 45			*For Smelting Iron..... 357
Cripple Creek, Colo., Water Problem..... 44			Gases Desulphurized..... 193
Colo's, Gold Yield..... 246			*Oil, for Assaying and Melting..... 49
Drainage Problem..... 124			Practice in Iron Gre Reduction..... 157
Gold Values..... 124			*Utilizing Waste Heat..... 149
Mine Merger..... 705			Igniting Flues..... 217
Mining Lenses..... 172, 363			Fusible Plugs for Steam Vessels..... 233
*Reel..... 207			
*Crofton, B. C., Smelter..... 29, 62, 193, 346			
Crossit in Machine Drill..... 336			
Crosscut Tunnel..... 142, 365			
Crosscuts..... 264, 336			
Cruiche for Aluminum Alloys..... 217			
*Crucibles, Method of Recharging..... 255			
Crude Oil in Smelting..... 336			
*Gill Gas Engine..... 336			
*Crushing and Pulverizing Mill..... 76			
And Its Relation to Extraction..... 217			
In Stamp Mill..... 3			
*Rolls..... 327			
*Cummer Patent Mechanical Stoker..... 307			
*Cummer & Son Co..... 312			
Cumming, Geo..... 362			
Cumming Portable Forge..... 236			
*Cumural Property, Sonora, Mexico..... 123			
*Cupeling Furnace..... 123			
Cupel, New Form of..... 36			
Cupola Iron Melting..... 332			
Curling Rubber Belt Slipping..... 332			
Current Rectifier, How Made..... 126			
*Cutterhead for Hydraulic Dredgers..... 193			
Cyanate of Potassium Production..... 193			
Cyanide Assay for Copper..... 24			
Consumption of Zinc..... 336			
Duty on..... 126			
For Removing Rust From Steel..... 126			
Impurities of..... 336			
Of Potassium, How Made..... 45			
Of Silver for Plating..... 217			
*Operations at Fay, Nevada..... 231, 237, 238			
Patent Decision..... 276			
Plant, Cost of in Black Hills..... 3			
Plant of California King G. M. Co..... 336			
Poisoning, Antidote..... 3			
Practice at Idrebas Mining, Colorado..... 173			
Practice in Australia..... 123			
Process and Oxygen..... 113			
Process, Notes on..... 267, 268			
*Process of Working Gold and Silver Ors..... 76			
Process' Selective Action..... 166			
Process, Use of Charcoal in..... 136			
Slimes, Flux for..... 56			
Solution..... 142			
Solution Alkalinity..... 56			
Solution, How Assayed..... 113			
Solution Reduction..... 218			
Solutions, Assays of..... 126, 322			
Treatment of Gold and Silver Gre..... 218			
Treatment of Slimes..... 216			
Use of Zinc Dust..... 131			
Works, By-products From..... 294			
Cyaniding Concentrates..... 351			
And Coarse Crushing..... 296			
At the Highland Chief, South Dakota..... 233			
Consumption of Zinc..... 126, 336			
In the Assays..... 265			
Gold Ore Without Pulverizing..... 223			
New Zealand Ore..... 201			
Ore Without Fine Crushing..... 303			
Silver Gves..... 279			
Wet Crushed Ors in New Zealand..... 279			
With Barium-Dioxide..... 126, 336			
With Charcoal..... 306, 336			
With Direct Amalgamation and Dry Crush- ing..... 311			
Danger in Thawing Giant Powder..... 326			
Davis, F. M., Iron Works..... 245			
Death of Finder of Largest Gold Nugget..... 160			
From 110 Volts Alternating..... 270			
Debris in California Rivers, Sources of..... 113, 293			
Decade of Mineral and Mining Returns..... 127			
Decapod Engine..... 219			
Decision in Cyanide Patent Case..... 276			
Declining Interest Rates..... 57			
Desp Borings in the United States..... 10			
Lake Mine Temperature..... 50, 125			
Mine Hoisting..... 8, 22, 35			
Deepest Mins Shaft in United States..... 233			
Gold Mine in the Country..... 100			
*Degrees Baums, "What It Means"..... 217			
*Ds Lamar, Nev., Mines..... 282			
Deming, J. J..... 188			
Democratization of Silver in Mexico..... 350			
Denver Engineering Works Co., 41, 110, 123, 155, 259			
*Denver Fire Clay Co..... 76			
Department of Mines Report, West Australia..... 83			
Mines and Mining..... 201, 215, 294			
Deposition of Ore..... 312			
Of Ors by Underground Waters..... 281			
Derivation of Placer Gold..... 142			
*Dern, Jno..... 164			
Desert Land Entries..... 100			
Desulphurizing Sulphide Ores Preparatory to Smelting..... 91			
Furnace Gases..... 193			
*Detail of Head Frams, El Dorado Co., Cal..... 309			
*Details of Cyaniding at Fay, Nev..... 231, 237, 238			
Detecting Counterfeit Coin..... 306			
Determination of Coal Consumption..... 84			
Of Copper (Volumetric)..... 51			
Of Minerals..... 69			
Of Silver in Residuum From Zinc Distilla- tion..... 217			
Gr Specific Gravity..... 292			
Determining Copper, Iron or Zinc in Cyanide So- lution..... 32			
Of Electric Hoisting Plants..... 250			
Detent of Frame..... 292			
Development by Tunnel..... 292			
*Device for Preventing Gas or Oil Wells From Gushing..... 336			
*For Handling Shaft Water..... 296			
*For Operating Concentrating Tables..... 284			
*For Securing or Releasing Trap Floors for Gas Cars..... 249			
Deville-Deshay Method of Refining Platin- um..... 126			
Dexter, Nev., Slimes Treatment..... 142			
*Diagram of Isothermal Compression..... 205			
Diameter of Pipe..... 249			
Of Engine Drum..... 157			
Diamond Drilling, Rossland, B. C..... 66			
Drill Setting in Mines..... 183			
Diamonds Used for Drilling..... 183			
Of South Africa..... 351			
*Diaphragm Lift and Force Pump..... 327			
Dickman, Mackenzie & Potter..... 230			
Difference Between Granite and Syenite..... 233			
Difficulties of Investors..... 232			
Dime Cuts in South Dakota..... 62, 32			
Dimensions of Mine Post Timbers..... 71			
Of Tank..... 365			
Dip of Vels..... 311			
Direct Amalgamation and Dry Crushing..... 311			
Acting Engine, What It Is..... 20			
Application of Direct Current..... 235			
*Direct Current, How Made..... 157			
Connected Gas Engine..... 157			
Cyaniding of Wet Crushed Ors in New Zealand..... 203			
Method of Separating Platinum From Gold or Silver..... 64			
Dirty Quicksilver, How Cleaned..... 224			
Discharge of Fair..... 32, 113			
*Double Cuts in South Dakota..... 232			
Dissolving Powers of Gold Solvent Solutions..... 202			
The Smelter Trust..... 6			
Distillate Oil..... 233			
Distribution of Platinum..... 246			
Disuse of Water Right..... 276			
Ditch Rights..... 157			
Dividend..... 29, 42, 63			
Divining Rods..... 362			
Dohle, R. McF..... 249			
*Does Gold Grow?..... 306			
Dokimastic Test..... 114			
Donnelly District, Nevada..... 173			
Donorens Cyanide Mill, Florence, Colo..... 173			
*Double Cuts in South Dakota..... 232			
Drainage at Cripple Creek, Colo..... 246			
*Dredge..... 192			
Scraper..... 64, 310			
*Dredger Bucket..... 165			
*And Excavator..... 206			
Power Required for..... 322			
Dredging Gold on Feather River, Cal..... 276			
*Pump..... 247			
Dressing Commutators..... 46			
*Drier for Ors..... 271			
Drift, Grade of..... 142			
*Drill Bits, Shaping and Sharpening..... 91			
*For Oil or Other Wells..... 255			
*Holding Chuck Bolt..... 105			
*Rod Grab..... 133			
*Shaper..... 47			
*Drilling Contest at Idaho Springs, Colo..... 74			
For Gold Dredging..... 116, 176			
*Machine..... 249			
Machines, How Made for..... 249			
*Drop Test, Stamp Mill..... 157			
Drop for Engine, Diameter of..... 311			
Dry Crushing With Direct Amalgamation and Cyanidation..... 10, 326			
*Gre Concentrator..... 339, 353			
Process for Treatment of Complex Sulphides Gre..... 312			
*Dryer, New Type..... 357			
*Drying Air for Blast Furnaces..... 157			
Dues in Technical Societies..... 51			
*Dump Car..... 74, 296			
*Dumping Device..... 313			
*Frame for Shafts..... 336			
Duplicate Sinking Pumps..... 336			
Durant, T..... 250			
Durham, E. B..... 351			
Dust From Quicksilver Condensers..... 142, 325			
Duty of Air Compressor..... 126			
On Cyanide..... 351			
Of Double Cylinder Hoisting Engine..... 20			
Of Electric Current..... 233			
On Imported Quicksilver..... 306, 336			
Gr Pump..... 322			
Dyed Candle Wick Preventive of Theft..... 322			
*Edwards Air Pump..... 103			
Effect of Oil Fuel on Boilers..... 126			
Efficiency of Pump..... 71			
Of Air Compressor..... 234, 306			
Gr Methods of Power Transmission..... 276			
Elasticite Roofing Co..... 289			
*El Dorado, Cal., Head Frame..... 306			
Electric Lamps..... 113			
Batteries..... 217			
Blindness..... 113			
Chills Protection..... 113			
Commutator..... 217			
Conductors..... 20			
Current, Duty of..... 219			
Current Required by Motors..... 129			
Currents, Continuous and Alternating..... 91, 135, 314			
*Furnaces..... 192			
*Igniter for Explosive Engine..... 202			
Incanescent Light, Temperature of..... 20			
Light Filaments, How Made..... 20			
Light Plant on Steamship, First..... 306			
Locomotives, Weights of..... 10, 105			
*Meter..... 217			
Power, Cost of..... 104, 111, 115			
Power in Rhodesian Mines..... 269			
Resistance of Wirs..... 32			
*Rock Drill..... 320			
*Smelting Furnace..... 309			
*Storage Battery..... 269			
Three-Phase Plant at Essen, Germany..... 269			
*Transmission Capacity of Bay Co. Counties'..... 84			
Power Lines..... 165			
Transmission Possibilities..... 113			
Transmission System in Montana..... 113			
Electrical Demand for Mica..... 113			
*Electric Drilling..... 232			
Development..... 279			
Development, White River, Wash..... 369			
Engineers, Notes for..... 111, 115			
*Equipment C. & C. Shaft, Virginia, Nev..... 233, 347			
Power for General Mining Purposes..... 233, 347			
Production of Zinc Shavings..... 227			
Progress in California..... 292			
Recovery From Waste Tin..... 157			
Street Lighting in San Francisco..... 193			
Treatment of Ors..... 173			
Units of Measurement..... 173			

	PAGE.
Mineral Application of Geology to	145
Advertisements	2
And Metallurgical Advance	277
*And Metallurgical Patents, 10, 25, 37, 51, 63, 76, 91, 105, 118, 133, 140, 165, 173, 192, 208, 223, 239, 255, 271, 284, 298, 314, 338, 342, 357, 370.	277
Asbestos in Canada	45
Bureau for Oregon	216
Claim When Side Lines Become End Lines	322
Claims in British Columbia	322
Code of Mexico	264
Conditions in South Africa	124
Congress	58, 99, 103, 112, 138, 139, 141
Decisions	260, 278, 292
Drugs	99
Employment Bureau	99
Engineering, Credit of	46
Engineers	98, 112
Experts	99
Flint Issues of	268
Industry and Geological Survey	264
Industry at the St. Louis Exposition	201, 203
In Pressure Vessels	292
Influence and Potency of	30
Investments	83
Law, 3, 20, 45, 84, 113, 126, 141, 157, 173, 188, 218, 275, 292.	18, 19, 141
Law Amendments	18, 19, 141
Lenses in Cripple Creek, Colo.	192
Litigation, Value in	184
Litigation	277
*Machine	255
Machinery Catalogues	105
Machinery Freight Rates	305
News in Mining Papers	112
Papers	112
Partnerships	118
Participated in Forest Reserves	142
Plant Machinery	175
Progress	305
Property, Calculating Value of	186
Summary	Every Issue
Topics	277, 291
*Turquoise in Arizona and New Mexico	322
Work Photographs	363
MINING AND SCIENTIFIC PRESS, 43rd Year.	363
Minnesota Mines	108
Missed Shots, Picking Out	196
Missouri Mines	27, 54, 95, 108, 168, 258, 301
Mistakes of Miners	100
Not Irrevocable	185
Model Stamp Mills	363
*Tunnel	363
Modern Charcoal Plant	301
Inventor	156
Moisture in Steam	100
Mollitor, T.	319
Mollman, W.	46
Molybdenite	84, 186, 336
Money Spent in Mining Ore	292
Modern Electric Transmission System	160
Mines	13, 23, 30, 54, 66, 70, 95, 121, 137, 152, 168, 106, 211, 227, 243, 258, 274, 287, 301, 317, 331, 346, 374
Mineral Laws	71
*Smelting Structures	140
Montgomery, J. H., Machinery Co., 214, 246, 275, 289.	140
Moore, C. C. & Co.	289
More, G. S.	362
Mortality Among Miners	278
Mortar, Individual	247
Frost-Proof	278
In Stamp Mill, Evolution of	312
Most Economical Engine	128
*Motor	128
Motors, Current Required for	129
Mountain Copper Co. Strike	346, 364
Mountain Formation	1, 30
Ranges of Pacific Coast	259
Moxham, A. J.	84, 171, 174
*Mr. Morgan, Australia, Mine	284
*Muller, J. H.	208
*Muller for Gas Engine	202
Multiple Cable	202
Multiplication-Addition Table	58
Mustard Oils	58, 105
Myrick, C. M.	326
N	
National Bureau of Standards	57
Drill & Manufacturing Co.	173, 351
Native Metals	173, 351
Silver Nuggets	142
Natural Coke	254
Need of Good Roads	127
Nell, J. W.	282
Nell, B. F., Co.	318
Nephrite	84
*Nevada Co., Cal's, Exhibit at San Francisco	124
Nevada Mines	14, 28, 40, 54, 80, 95, 108, 114, 121, 124, 137, 152, 168, 181, 197, 212, 227, 243, 258, 274, 287, 301, 317, 332, 346, 374
*New State Exhibit at San Francisco	124
Surface Mineral Wealth	4, 44
New Business	24
Colliery Explosive	281
Form of Cupel	36
Process Raw Hide Co.	70
Property of Matter	312
Type of Dryer	220
*Way to Get Levels	220
New Caledonia Mines	154
Newell, F. H.	99
New Jersey Mines	9
New Mexico Mines	14, 28, 40, 54, 80, 95, 108, 114, 121, 124, 137, 152, 168, 181, 197, 212, 227, 243, 258, 274, 287, 301, 317, 332, 346, 374
Mineral Camps, Average Elevation	71
New South Wales Mines	213
New York Subway	297
New Zealand Mines	96, 259, 293
Nicaragua Mines	32
Nickel Extraction From Sulfide Compounds	32
Bronze Alloy	84
In Canada	193
Process for Melting	100
Refinery	100
Steel Alloy	336
*Nitric Acid From Air	32
Acid for Parting	32
Nitro-glycerine Compounds	126, 336
Cellulose	336
Oilyerine, How Made	306
Powder Dangerous When Old	355
*Non-accessible "Stock"	100
Non-accessible Mining Stock	32, 306
Normal Solution of Sulfuric Acid in Cy	132
North America to be Spanned by Another Rail	207
Northern Electrical Manufacturing Co.	139
Mining Prospects	156
Norwegian Mines	41, 229
Notable Electrical Progress	127
Notes on Assaying	337
For Electrical Engineers	369
On the Estimation of Copper by Potassium	283
Permanganate	283
On Machinery Constituting a Mining Plant	175
On Sump Solution, Extractor Box Work, and Cleaning Up in Cyanide Process	267, 268
On Treatment of Zinc in Cyanide	223
aiding New Zealand Ore	223
Notes of New Patents	16, 30, 42, 55, 68, 82, 98, 111, 124, 140, 155, 170, 182, 198, 199, 214, 230, 246, 260, 289, 303, 319, 334, 348, 362.
Nova Scotia Mines	129
Nuggets, Formation of	142
Of Native Silver	142

	PAGE.
Occurrence of Native Quicksilver	351
Of Historic Interest	176
Oil Burning	249
And Coal Cost Equivalents	58
Companies in California	302
Diminishing Friction	90
For Boiler Firing	7, 24
For Fuel in California	41
For Mine Work	32, 365
*For Ore Separation	128
Fuel, Effect on Boilers	128
Fuel for Ocean Steamships	140
Fuel in Smelting Ores	113
*Furnaces for Assaying and Melting	49
"Of Ooid"	112
Process at Rossland, B. C.	44
Process for Ore Concentration	207
Production of Californian	113, 322
Prospecting	161
*Removal From Exhaust Steam	308
Oil's Chemical Composition	292
Steam Producing Qualities	45
Ogden Assay Co.	183
*Ogden-Luon Cut-off, S. P. R. R.	262, 266
Oklahoma Mines	80
Old Mining Property	308
Oldest Stamp Mill in America	298
Placer Deposits	365
Open Heaters Using Exhaust Steam	126
Operating a Hydraulic Elevator	217
Ore Bodies, Vagaries of	1
Bins	351
*Breaker	118
*Car	298
Cars, Large	20
*Concentrating Plant	354
Concentration by Use of Oil	307
*Concentrator	105, 255, 314, 323, 342, 357
*Conveying Surface	328
Cost of Handling	3, 20
*Crusher and Pulverizer	25
*Crushing Machine	192
Depositing Solutions, Salt Lake Basin	297
Deposition of	312
Deposits in Massive Rock	37
Dressing and Concentration	100
*Drier	271
Flue, Working in Large Furnace	58
Formation	113
*Furnace	113
*Grinding Apparatus	105, 165, 327
"In Sight," Weight of	3
*Leaching Apparatus	178
*Mixing Machine	314
Problem at Tonopah, Nev.	350
Roaster Decision	149
*Roasting Apparatus	149
*Roasting Furnace	105, 165, 327
*Sampler	51
*Separator	10, 91, 239
*Separation by Oil	25
Shoots	249
Shoots and Chutes	249
*Slimes Treatment	105
Test for	20
Testing Tables	128
Transportation at Rossland, B. C.	128
*Treatment for Silica	10
*Washer and Separator	63
Wet and Dry	173
Oregon Mines	14, 40, 54, 66, 80, 95, 99, 109, 121, 152, 169, 181, 197, 212, 228, 243, 258, 274, 288, 301, 318, 325, 346, 351, 375
Oregon's State Mining Bureau	516
Ores in Mexico, Value of	88
Bearing Copper	351
No Longer Refractory	2
Which Are Deposited by Underground Waters	281
Oriental Trade	219
*Oregon State, Leadville, Colo.	356
Orthoclase	3, 1
Osmium	73
Ownership of Mines	806
Oxidized Ore Treatment	50, 350
Oxidizing Agents in Cyanide Mill Solutions	113
Oxygen, How Generated	326
In the Cyanide Process	113
P	
Pacific Stamp Battery Evolution	74
Pacific Ocean Cable	349
Pacific Wire & Steel Co.	318
Packing in Gasoline Engine	58
Paint, How Removed From Old Oak	249
Palladium	72
Paper, How Made Transparent	302
Paraffine Paint Co.	334, 363
Park City, Utah, Sampling Works	130
Parke-Whitinker Cyanide Process	45
Parsons, J. H., Chemical Co.	214
Parting Gold and Silver Electrolytically	233
Process	32
Partnership in Mines	306
Paste for Mounting Purposes	32
Patent Infringement, Protection Against	185
For Mining Claim	32, 141, 156, 306, 336, 348
Patents for Public Lands	71
*Mining and Metallurgical	10, 25, 37, 51, 63, 76, 91, 105, 118, 133, 149, 165, 173, 192, 208, 223, 239, 246, 255, 271, 284, 298, 303, 314, 323, 342, 357, 370.
Notices of	16, 30, 42, 55, 68, 82, 98, 111, 124, 140, 155, 170, 182, 198, 199, 214, 230, 246, 260, 289, 319, 334, 362, 375.
Delays in	232
Patience Requested	249
Patio Process for Amalgamation of Silver Ores	59
Patterns, Relative Weight of Castings	142
Pattinson's Process for Separation of Lead and Silver	233
Payboots	58
Paystreak in Placer Mine	20
Pelton Water Wheel Co.	198, 213
Pennsylvania Mines	244, 274, 318
Percentage of Ash in Coal	173
Of Placer Gold in World's Production	233
Permanent and Immovable Improvements on Mining Claim	278
Personal Mention in Trade Journals	123
Peruvianena	32, 366
Peruvian Mines	98, 97, 239, 289, 392
Petrified Wood	155
Petroleum Briquettes	7
Production of	293
Use in Smelting	233
Weight of	233
Phenomena of Solids	112

	PAGE.
Philippine Mines	81
Tariff on American Machinery	302
Photographs in Mine Work	32, 322
Pickard, H. K.	330
Picking Out Missed Shots	126
*Pipe Muffer for Gas Engine	298
Diameter	249
How to Bend or Curve	113
Line From Bakersfield, Cal.	302
*Perforating Machine	178
Pipes, Signaling Through in Mines	173
Piston "Explosion" at Portland, Or	181
Rod Packing	336
Placer Gold, Derivation of	142
Gold, Percentage of in World's Production	233
Locations	20, 45, 186, 249, 365
Mining	810
Plagioclase	351
Plate Amalgamation	142, 268
Platinoid Metals	32
Platinum	32, 99, 103, 148, 231, 248, 278
Group of Metals	73, 231
How Separated From Gold or Silver	84
In Wyoming Copper Ore	254
Ore	351
Ore, Methods of Refining	126
Production in Russia	233
Salt Water Cyanide Process	15
Pneumatic Cyanide Process	15
Cyanide Mill at Florence, Colo.	173
Drills, Weight of	264
Rock Sampler for Dredger	84
*Pocket Elevator and Conveyor	339
Pockets in Quartz	294
In Colorado Co., Cal.	217
Poor Man's Mining	172
Portable Boiler	365
Portland Cement	202
*Portland, Colo., Gold Mine	184, 187, 188, 189
Portland, Colo., Mill	296
Porto Rico Mines	289
Possibilities of Electrical Transmission	84
Postpaid Cyanide Treatment for Gold	186
Copper Ores	186
Cyanide, How Made	45
Powder Smoke, How Best Killed	351
Powell, J. W.	183
Power Required for Ooid Dredger	322
Drills	89
Of Explosives, How Figured	3
Of Falling Water	157
Of Steam Engines, How Increased	84
*Required for Isothermal Compression	205
Transmission by Belt	306
Transmission by Rope	322
Transmission of Electricity	278
Transmission of Steel Cable	295
*Practical Mine Pointers	295
Papers at Mining Congress	58
Precious Stones, How Identified	101
Preparing Steel for Filing or Turning	113
Prescott, Geo. W.	362
Presence of Gold in Iron Pyrites	173
Practical Practice	173
Ratio of Silver and Gold	306
Preservation of Forests	293
Preserving Hoisting Rope	20
Pressure on Dam	20
At Bottom of Shaft	278
Occasioned by Wind	157
Of Air Loss of	161
*Of Water	161
Of Water Issuing From Boiler	173
Pressure in Rivet Work	186
*Preventing Oil Wells Gushing	328
Grit and Dust in Machine Drill Work	365
Prevention of Boiler Scale	58
Preventive of Fumes in Mining Powder	217
Price of Silver Affecting Mining Industry	335
Of Copper	248
Prices of Back Numbers of This Paper	233
*Pride of the West M. & M. Co., Washington	340
Arizona	340
Primary Battery for Electrical Action	264
Principal Pump and Pipe	264
Principal Telluride Minerals	354
Principles of Prodt.	352
Pritchard, A. J.	260
Probert, F. H.	306
Process of Extracting Copper and Nickel From Sulfide Compounds	51
For Treating Telluride Gold Ores	378
For Treating of Zinc Ores	322
Of Combining Titanium With Iron	314
Of Desulfurizing Furnace Gases	193
Of Electrolytic Separation of Copper and Nickel	342
*Of Eliminating Sulphur From Sulphide	192
*Of Extracting Bromide From Brine	323
*Of Extracting Precious Metals	133
*Of Magnetically Treating Ores	328
*Of Making Coke Ovens Tight	76
*Of Making Orapelite	240
*Of Making Sodium Cyanide	368
*Of Making Water Lead	193
*Of Melting Nickel	193
*Of Obtaining Metals From Their Ores	342
*Of Precipitating Metals From Solutions	323
*Of Producing Cyanide of Potassium	193
*Of Producing Metallic Antimony	314
*Of Producing Steel Direct From Oxide of Ore	133
*Of Recovering Metallic Copper From Copper Precipitates	270
*Of Reducing Metals From Their Ores	255
*Of Refining Lead and Zinc Fume	357
*Of Shutting Off Water in Drilled Oil Wells	341
*Of Treating Anode Residue	384
*Of Treating Dry Sulphide Ores	339
*Of Treating Metal	328
*Of Treating Ores	118, 224
Production of Copper	128
Of Borax	160
Of Gold	57, 279
Of Old in United States	166, 279
Of Lead	123
Of Petroleum	7
Professional Etiquette	321
Profit Sharing With Employees	278
Profits of Gold Dredging in New Zealand	279
*Progressive Combustion	230
Promoters and Miners	204
Property Right in Trade Name	204
Prospecting for Oil	181
Permitted in Forest Reserves	142
Prospector and Advice	83
Prospectors' Requirements	5, 141
*Boats	254
Prospects Developed Into Mines by Leasers	233
Protection Against Patent Infringement	185
*Of Wire Ropes	181
Proteins	249
Protoplasm	278
Public Lands, Absorption of	32
*Pulverizer	32
Pump Capacity, How Figured	3
Dredging	310
Duty of	306
Efficiency	32, 71, 173
*For Dredging	247
*Slide Valve	192
Pumping Oil IVs by Compressed Air	32
*Plant in Utah	367
Station at Divide, Montana	104
Water, Necessary H. P.	233, 338
Pumps for Station Work	173
For Placer Mining	173
Of the Triple-Vane Type	310

	PAGE.
Pure Silver, How Produced.....	3
Purifying Hydrocarbon Oils.....	63
Pyne Smelter.....	214
Pyrites Containing Gold.....	217
Pyritic Smeltline of Gold.....	283
Smelting Charge.....	58
Pyrrhotite in Californian.....	351
Q	
Quadruple Discharge Stamp Mill.....	247
Quarry of Ornnite in Colorado.....	82
Quartation.....	126
Quartz Mining by Electric Power.....	104
And Placer Locations.....	306
Mill Assessment.....	265
Mill Construction.....	351
Pockets In.....	264
Weight of.....	100
Quartzite, What It Is.....	264
Questions and Answers.....	228, 230, 263, 265, 296, 313
Quicksilver.....	47, 100
*Furnace.....	224
Ore, Assay of.....	202
Ore, Value of.....	202
Production of, 1901.....	233
R	
Railroad to Angels, Cal.....	172
Railway Land Sales.....	278
*Cut-off at Salt Lake, Utah.....	104, 262, 266
Fuel Oil.....	200
Raising Gravel in Placer Mining.....	310
Ramsborn Mine, Idaho.....	20
Randall System of Slimes Treatment.....	298
Rand Cyanide Works, By-products From.....	131
Rand Drill Co.....	29, 97, 275
Rankin Copper Leaching Process.....	3, 327
Rare Earths, Values of.....	126
Ratio of Silver and Gold.....	306
Recharging Smelters' Crucibles.....	255
Reclproosing Engines, Speed of.....	217
Recovering Metallic Copper From Copper Pre- cipitates.....	240
Recovery of Arsenic From Ores and Metallur- gical By-products.....	130
Red Cross Telephone Mouthpiece.....	117
Red Jacket, Cal., Drift Mine.....	186
Reducing Copper Matte to Refined Copper.....	63
Valve.....	173
Reduction of Iron Ore in Blast Furnace.....	157
Of Cyanide Solution.....	113
*Of Metals From Their Ores in Electrically Heated Furnaces.....	76
Of Ore at Tonopah, Nev.....	350
Of Tungsten Ore.....	265
Reel for Engineers.....	307
Refining Copper Electrolytically.....	202
Platinum Ore.....	126
Reformed Copper Ores.....	75, 85
Refractory Ores, No More.....	20
Refrigeration by Compressed Air.....	207
Rege eration of Burnt Steel.....	292
Relation Between Electricity and Magnetism.....	172
Of Altitude and Air Temperature.....	217
Of Geological Survey to Mining Industry.....	264
*Of Rainfall to Run-off in California.....	6
Relative Dissolving Powers of Different Gold.....	292
Solvent Solutions.....	202
Removal of Bark From Mine Timbers.....	142
*Removing Oil From Exhaust Steam.....	208
Renewals of Sal-ammoniac in Battery.....	173
Renewing Cylinder Head Packing.....	58
Repat, C. H.....	143
Replacement of Machinery.....	125
Reports on Mines.....	201
Representation Work.....	249
Reservoirs for Water Supply.....	232
Resin for Soldering Tin.....	126
Resistance of Wire.....	32, 173
In Water Flow.....	100
*Restraining Barriers in Yuba River, Cal 41, 89, 90	84
*Reports on Mines.....	201
Retorting Quicksilver.....	84
*Reverberatory Building, Washoe Co, Butte, Montana.....	140
*Revolving Furnace for Roasting Ores.....	299
Reynolds, W. C.....	334
Rime Blocks for Sluices.....	32
Rights of Plaintiff.....	30
Rio Tinto Copper Mine, Spain.....	50
Riparian Rights in California.....	20, 306
Rivet Pressure.....	186
Rivets, Tensile Strength of.....	100
Road Orades.....	129
*Roasting Ores.....	314, 338
Furnace.....	289
Sulphide.....	233
*Robertson, J. L. & Sons.....	311
Robins Belt Conveying Co.....	198, 238
Rock, Definition of.....	249
*Boring Machine.....	25
*Drill.....	178, 230, 240, 324, 330
*Drill Machine Bit.....	223
*Drilling Engine.....	223
*Drilling Contest at Hubble Springs, Colo.....	322
Drilling for Deep Holes.....	141, 323
Scraper for Dredger.....	84
*Rock Drill as Blacksmith's Hammer.....	177
Roof for Tunnel.....	357
Rope Transmission of Power.....	322
Rose Thair.....	238
*Rotary Drilling Machine.....	223
*Engine.....	51
*Mixture for Concrete.....	25
*Slide Valve for Pumps, Etc.....	192
Rough and Ready Test for Ores.....	31
Rounded Rocks.....	365
Roy & Thomson.....	129
*Rubber Belt Slipping, How Cured.....	322
Rubble Wall Requirements.....	58
Russian Production of Platinum.....	233
Rust Preventive on Machinery.....	278
Removal From Steel.....	126, 142
Ruthenium.....	73
Rusty Iron, How Cleaned.....	82
S	
*Safety Attachment for Hydraulic Nozzles.....	165
*Hoisting Hook for Ore Buckets, Etc.....	63
Sal-ammoniac, How Made.....	142
Salt Solution.....	284
Sampling Works at Park City, Utah.....	130
San Francisco Electrical Street Lighting.....	157
*Santa Maria del Oro Mine.....	82
Sault Ste. Marie Water Power Canal.....	125
*Savage Basin, San Miguel Co., Colo.....	215
(Continued on Next Page.)	

December 27, 1902.

PAGE

	PAGE
Van der Naalen School of Engineering.....	47
Van Embo, B. C.....	97
Vaporized Quicksilver in Amalgamation.....	385
Vein, Dip of.....	217
Veins and Wall Rocks.....	217
Hidden, Searching for.....	284
Velocity of Flow of Water.....	217, 306
And Discharge of Water Through Submerged Orifices.....	229
Veneer in Mines.....	110
Ventilation in Mines.....	830
*Ventilator for Mines.....	307
Virginia Mines.....	103
Volume of Free Air Used With 3-Inch Drill.....	205
Of Water, Energy of.....	157
Of Water Flowing From Tank.....	278
Volumetric Efficiency of Air Compressor.....	234
Determination of Copper.....	51
Von der Ropp, A.....	876
Voyte, Jos.....	38, 87
W	
Wall Rocks and Veins.....	217
Wardle, F. R.....	238
Warrant or Guarantee of Manufacturer.....	284
Warren, J. B.....	7, 24, 38
Washington Mines, 14, 29, 40, 55, 87, 81, 98, 109, 122, 133, 153, 189, 181, 193, 213, 228, 244, 258, 275, 288, 302, 318, 337, 347, 381, 876.	802
Waste From Shaft.....	58
Heat From Smelter Slag.....	278
Heat Utilized in Smelting Furnaces.....	149
*Water Attachment for Power Drills.....	37
On Cement.....	87
And Steam, Weight of.....	157
Cost of Raising in Western Mines.....	34
Discharge.....	32, 113
Discharge Equivalents of Miners' Inch.....	308
Expansion of When Freezing.....	233
Falling Vertically Down Face of Dam.....	45
Flow, How Utilized.....	128
Flow, Resistance of Friction.....	100
*From Miner's Ditch.....	100
Gallons and Cubic Foot.....	100
Handling in a Shaft.....	298
Legal Measurement of, in California.....	45
Measurement in the Yukon.....	177
Motor.....	88
Power Applied Direct to Circular Saw.....	284
Penal at Sault Ste. Marie.....	125
Pressure.....	378
Pressure at Bottom of Shaft.....	173
Pressure From Boiler.....	173
Problem at Leadville, Colo.....	33, 44
Put in Boiler Without Pumping.....	385
Required Amount to Run Hydraulic Elevator.....	238
Required for Coal and Steam Engine.....	32
Requirements for Stamp Mill.....	33, 338
Requirements of Boiler.....	338
Right Disuse and Non-disuse.....	278
Rights in California.....	20
Supply Reservoir.....	233
Theoretical Horse Power.....	308, 350
Velocity and Discharge of Through Submerged Orifices.....	229
Velocity of Flow.....	217, 306
Volume of Flowing From Tank.....	278
*Wheel.....	85
Working Energy of.....	157, 217
Worn Gold.....	3
Waterproofing Blue Prints.....	84, 100
Canvas.....	143
Wear caused by Stone and Dies.....	219
*Wehster Camp & Lane Co.....	308
Weigle Pipe Works.....	198
Weight of Different Parts of Stamp.....	308
Of Lead Pipe.....	323
Of Ore "In sight".....	8
Of Patterns and Castings.....	143
Of Pneumatic Drills.....	284
Of Quicksilver.....	100
Of Silver Coins.....	189
Of Steam and Water.....	217
Per Mile per Ohm.....	20
Weights of Electric Locomotives.....	3
Welding Cast Iron.....	3
West African Gold Coast.....	32
West Australian Mine Report.....	83
West Carolina Drill Co.....	183
Western Engineering & Construction Co.....	183
Westhousen E. & M. Co.....15, 29, 55, 111, 139, 170, 183, 334, 382.	170
Wet Assaying of Chalcopryrite.....	173
And Dry Ore.....	173
Crushed Ores, Direct Cyaniding of in New Zealand.....	308
Reduction of Copper Ores.....	187, 218
Wetherill Magnet Separator.....	128
What Constitutes a Mine.....	10
*Wheeler Scraper.....	10
Wheeler, B. I.....	293, 304
When Ice Ran Up Hill.....	180
Whim, What It Is.....	264
Why a Boiler Explodes.....	45
Mercurial and Thermometers.....	188
Of Different Sluice Plates.....	283
"Wildcat" Mines.....	283
Windmill, Horse Power of.....	173
Wind Pressure.....	157
Wingate, W.....	223
Wire Rope Preservation.....	20
Rope Construction.....	308
Use of Wire for.....	338
Rope Protection.....	139
Rope Tramway.....	247
Rope Transportation.....	247
Wireless Telegraphy.....	88, 100
Wisconsin Mines.....	110
Graphite Co.....	260
With a Grain of Salt.....	132
Wolframite.....	20, 284
Wollaston Method of Refining Platinum Ore.....	126
Wollastonite.....	311
Wood for Fuel in Reverberatory Furnace.....	238, 264
Rendered Flexible and Non-inflammable.....	202
Work of National Bureau of Standards.....	57
Working Fine Ore in a Large Size Furnace.....	58
Energy of Water.....	157
Pressure of Air Drills.....	50
*Wrapper for This Paper.....	50
Wyoming Mines.....14, 40, 55, 87, 81, 98, 110, 122, 153, 189, 198, 213, 223, 244, 275, 288, 302, 318, 333, 347, 381, 375.	802
Y	
Yale, Chas. G.....	9
Yellow Brass.....	142
Yuba River, Cal., Restraining Barriers.....	44
Yukon Mines.....15, 41, 44	183
Water Measurement.....	177
Z	
Zinc Acetate.....	285
As a Preventive of Boiler Corrosion.....	84
Consumption of in Cyaniding.....	238, 338
Contact With Copper, Iron or Lead.....	278
Use of in Cyanide Work.....	21
*Furnace.....	19
Mining Companies of Joplin, Mo.....	350
Ore Treatment.....	25
Precipitate Assay.....	32, 186
Precipitate, Gold Losses From.....	388
Production.....	178
Reduction Works at Butte, Montana.....	123
Smelters and Acids.....	85
Surface Exposure.....	13

